APPENDIX A. SEARCH STRATEGIES

MEDLINE

1	exp Veterans/
2	(veteran$ or VHA or VAMC or VAHCS).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
3	1 or 2
4	exp Socioeconomic Factors/ or exp "Social Determinants of Health"/
5	(social adj2 determinant$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
6	((social adj2 factor$) or (behavior$ adj2 factor$)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
7	(transgender or gender identity).mp. or exp Gender Identity/ [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
8	((sexual adj3 minority) or sexual orientation or sexual preference).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
9	(employ$ or unemploy$ or underemploy$).mp.
10	exp Employment/ or job opportunities.mp.
11	(impoverished or low-income).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
12	exp Educational Status/
13	(academic or occupation$ or degree or diploma).mp.
14	(family dysfunction or child$ neglect or runaway or foster care).mp.
15	social support.mp. or exp Social Support/
16	exp Foster Home Care/ or foster home.mp.
17	child abuse.mp. or exp Child Abuse/
18	exp Life Change Events/ or adverse childhood event$.mp.
19	Violence.mp. or exp Violence/ or exp Domestic Violence/ or exp Intimate Partner Violence/ or exp Exposure to Violence/ or exp Workplace Violence/
20	((trauma or violence) and (child$ or youth or adol$)).mp.
21	exp Poverty/ or poverty.mp.
22	exp Repression, Psychology/ or exp "Adult Survivors of Child Abuse"/ or exp Child Abuse, Sexual/
23	(intimate partner violence or IPV).mp.
24	exp Homeless Youth/ or exp Homeless Persons/ or homeless$.mp.
25	exp Health Services Accessibility/
26	(access and care).mp.
27	exp Rural Health/ or exp Rural Population/ or exp Rural Health Services/ or rural$.mp.
28	exp Urban Health Services/ or exp "Health Services Needs and Demand"/
29	exp Suburban Health Services/
30	exp Criminals/ or exp Criminal Behavior/ or (justice-involved or (justice adj involved) or (Veteran$ adj2 court) or incarcerat$ or prison or jail or recidivism).mp.
31	(community resource$ or neighborhood or transportation or parks or mobility or livability).mp.

32	exp Residence Characteristics/
33	exp Environment Design/
34	demograph$.mp.
35	4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34
36	3 and 35
37	exp Epidemiologic studies/ or exp case-control studies/ or exp cohort studies/ or case control.tw. or (cohort adj (study or studies)).tw. or cohort analy$.tw. or (observational adj (study or studies)).tw. or longitudinal.tw. or retrospective$.tw. or prospective$.tw. or cross-sectional.tw. or exp cross-sectional studies/
38	36 and 37
39	limit 38 to english language
40	limit 36 to (clinical study or clinical trial, all or clinical trial or comparative study or controlled clinical trial or evaluation studies or government publications or letter or meta analysis or multicenter study or observational study or pragmatic clinical trial or randomized controlled trial or systematic reviews)
41	limit 40 to english language
42	limit 36 to (pragmatic clinical trial or randomized controlled trial)
43	42 not 38

CINAHL

S1	AB ((social N2 determinant*) OR (socioeconomic N2 factor*) OR (social N2 factor*) OR (behavior* N2 factor*))
S2	AB (transgender OR gender identity OR (sexual N3 minority) OR “sexual orientation” OR “sexual preference”)
S3	AB (employ* OR unemploy* OR underemploy* OR (job N2 opportun*) OR poverty OR impoverished OR low-income OR “low income” OR academic OR occupation* OR degree OR diploma OR education*)
S4	AB (“family dysfunction” OR (child* N2 neglect) OR runaway OR “foster care” OR “social support” OR “foster home” OR (child* N2 abuse) OR (life N2 chang* N2 event*) OR (adverse N2 childhood N2 event*) OR violence OR “domestic violence” OR “intimate partner violence” OR IPV or (exposure N2 violence) OR (work* N2 violence) OR ((trauma OR violence) AND (child* or youth or adol*)) OR homeless*)
S5	AB ((“health services” AND (need* OR demand OR access*)) OR (access AND care) OR (access AND service*) OR rural* OR (urban AND health) OR (suburban AND health))
S6	AB (criminal* OR “criminal behavior” OR “justice involved” OR justice-involved OR (Veteran* N2 court) OR incarcerat* OR jail OR recidivism)
S7	AB (“community resource*” OR neighborhood OR transportation OR parks OR mobility OR livability OR residence OR (environment* W5 design) OR demograph*)
S8	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7
S9	AB (Veteran* OR VHA OR VAMC OR VAHCS)
S10	S8 AND S9
S11	Limiters: Research Article: Peer Reviewed; English; Exclude MEDLINE records

PsycINFO

S1	DE “Military Veterans”
S2	AB (Veteran* OR VHA OR VAMC OR VAHCS)
S3	S1 OR S2
S4	DE “Socioeconomic Status”

S5	AB ((social N2 determinant*) OR (socioeconomic N2 factor*) OR (social N2 factor*) OR (behavior* N2 factor*))
S6	AB (transgender OR gender identity OR (sexual N3 minority) OR “sexual orientation” OR “sexual preference”)
S7	AB (employ* OR unemploy* OR underemploy* OR (job N2 opportun*) OR poverty OR impoverished OR low-income OR “low income” OR academic OR occupation* OR degree OR diploma OR education*)
S8	AB (“family dysfunction” OR (child* N2 neglect) OR runaway OR “foster care” OR “social support” OR “foster home” OR (child* N2 abuse) OR (life N2 chang* N2 event*) OR (adverse N2 childhood N2 event*) OR violence OR “domestic violence” OR “intimate partner violence” OR IPV or (exposure N2 violence) OR (work* N2 violence) OR ((trauma OR violence) AND (child* or youth or adol*)) OR homeless*)
S9	AB ((“health services” AND (need* OR demand OR access*)) OR (access AND care) OR (access AND service*) OR rural* OR (urban AND health) OR (suburban AND health))
S10	AB (criminal* OR “criminal behavior” OR “justice involved” OR justice-involved OR (Veteran* N2 court) OR incarcerat* OR jail OR recidivism)
S11	AB (“community resource*” OR neighborhood OR transportation OR parks OR mobility OR livability OR residence OR (environment* W5 design) OR demograph*)
S12	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11
S13	S3 AND S12
S14	Limiters: Publication Type: Peer Reviewed Journals Periodical; Document Type: Journal Article; English

Sociological Abstracts

S1	Veteran* OR VHA OR VAMC OR VAHCS
S2	(social NEAR/2 determinant*) OR (socioeconomic NEAR/2 factor*) OR (social NEAR/2 factor*) OR (behavior* NEAR/2 factor*)
S3	transgender OR gender identity OR (sexual NEAR/3 minority) OR “sexual orientation” OR “sexual preference”
S4	employ* OR unemploy* OR underemploy* OR (job NEAR/2 opportun*) OR poverty OR impoverished OR low-income OR “low income” OR academic OR occupation* OR degree OR diploma OR education*
S5	“family dysfunction” OR (child* NEAR/2 neglect) OR runaway OR “foster care” OR “social support” OR “foster home” OR (child* NEAR/2 abuse) OR (life NEAR/2 chang* NEAR/2 event*) OR (adverse NEAR/2 childhood NEAR/2 event*) OR violence OR “domestic violence” OR “intimate partner violence” OR IPV or (exposure NEAR/2 violence) OR (work* NEAR/2 violence) OR ((trauma OR violence) AND (child* or youth or adol*)) OR homeless*
S6	(“health services” AND (need* OR demand OR access*)) OR (access AND care) OR (access AND service*) OR rural* OR (urban AND health) OR (suburban AND health)
S7	criminal* OR “criminal behavior” OR “justice involved” OR justice-involved OR (Veteran* NEAR/2 court) OR incarcerat* OR jail OR recidivism
S8	“community resource*” OR neighborhood OR transportation OR parks OR mobility OR livability OR residence OR (environment* PRE/5 design) OR demograph*
S9	S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8
S10	S1 AND S9
S11	S10 AND stype.exact(“Scholarly Journals”)
S12	S11 AND la.exact(“ENG”)
S13	S12 AND at.exact(“Article’)

APPENDIX B. PEER REVIEW COMMENTS/AUTHOR RESPONSES

Question	Reviewer Comment	Author Responses
Are the objectives, scope, and methods for this review clearly described?	Yes	Thank you.
	Yes	
	Yes	
	Yes	
	Yes	
	Yes	
	Yes	
	Yes	
	Yes	
Is there any indication of bias in our synthesis of the evidence?	No	Thank you.
	No	
	No	
	No	
	No	
	No	
	No	
	No	
	No	
Are there any published or unpublished studies that we may have overlooked?	No	Thank you.
	Yes - There are studies missing from the sexual orientation section that can correct/clarify some of the statements. Namely, the finding that there is “insufficient evidence whether prevalence differences exist in sexual minority and gender orientation between Veterans and non-Veterans” [by the way, gender orientation should be “gender identity”] should be clarified. The following studies have found, among various datasets, that Veteran status is overrepresented among sexual minority women than heterosexual women, and Veteran status is underrepresented among sexual minority men than heterosexual men: (a) Blosnich, J. R., Farmer, G. W., Lee, J. G., Silenzio, V. M., & Bowen, D. J. (2014). Health inequalities among sexual minority adults: evidence from ten US states, 2010. American journal of preventive medicine, 46(4), 337-349.	Thank you for the suggested 8 articles. Overall, 2 articles had been identified by our searches but were excluded for not meeting inclusion criteria, 1 report is not a peer-reviewed journal article (and thus not eligible for inclusion), and 5 peer-reviewed articles were not identified by our database searches. We reviewed these additional 5 articles, applying the same inclusion criteria, and found that none were eligible. In addition to providing detailed responses about each article below, we also wish to clarify that the proportion of individuals with military experience or Veteran status among certain groups (*eg*, by sexual orientation) would not give equivalent information as the prevalence of social determinants among Veterans and non-Veterans, or among engaged and non-engaged Veterans. We have

	(b) Blosnich, J. R., & Silenzio, V. M. (2013). Physical health indicators among lesbian, gay, and bisexual US veterans. Annals of epidemiology, 23(7), 448-451. (c) Blosnich, J. R., Gordon, A. J., & Fine, M. J. (2015). Associations of sexual and gender minority status with health indicators, health risk factors, and social stressors in a national sample of young adults with military experience. Annals of epidemiology, 25(9), 661-667. (d) Gates, G. J. (2013). Same sex and different sex couples in the American Community Survey: 2005-2011. (available here: http://escholarship.org/uc/item/8dk71277) Also, in addition to some of the studies above, others have documented differences between sexual minority and heterosexual veterans: (a) Blosnich, J. R., Bossarte, R. M., & Silenzio, V. M. (2012). Suicidal ideation among sexual minority veterans: results from the 2005–2010 Massachusetts Behavioral Risk Factor Surveillance Survey. American journal of public health, 102(S1), S44-S47. [Finding: greater prevalence of poor mental health among sexual minority Veterans, compared to heterosexual Veterans, after adjusting for several demographic confounders.] (b) Blosnich, J. R., Gordon, A. J., & Fine, M. J. (2015). Associations of sexual and gender minority status with health indicators, health risk factors, and social stressors in a national sample of young adults with military experience. Annals of epidemiology, 25(9), 661-667. [Finding: Greater prevalence of suicide attempt, HIV infection, and discrimination among LGBT Veterans compared with non-LGBT Veterans.] (c) Blosnich, J. R., Mays, V. M., & Cochran, S. D. (2014). Suicidality among veterans: implications of sexual minority status. American journal of public health, 104(S4), S535-S537. [Finding: Greater prevalence of lifetime suicide ideation among sexual minority Veterans compared with heterosexual Veterans.] (d) Booth, B. M., Mengeling, M., Torner, J., & Sadler, A. G. (2011). Rape, sex partnership, and substance use consequences in women veterans. Journal of traumatic stress, 24(3), 287-294. [Sexual minority women Veterans had higher rates of all measures of rape and rates of lifetime substance use disorder.	expanded the Introduction and Methods to clarify the rationale behind our selection of the latter comparisons as more likely to provide the most relevant results to address priorities and goals of our VHA partner. We have corrected “gender orientation” to “gender identity” on page 19. (a, b) These articles did not meet our inclusion criteria because they lack comparisons between groups of interest (*ie,* Veterans vs non-Veterans, or engaged vs non-engaged Veterans). (c) This article does not meet inclusion criteria as it does not distinguish between active military service and Veterans. (d) This is not a peer-reviewed journal article. We have added it to our discussion of reports and other grey literature. ---------- (a,c,d) These articles did not meet inclusion criteria because they lack comparisons of social determinant (*ie,* sexual minority status) by groups of interest. (b) This article did not meet inclusion criteria, as noted above.

	I also wonder if any studies from the Veterans Aging Cohort Study were located in the search – it's a rare dataset that has a large sample of Veterans who are men who have sex with men. Lastly, George Brown's study of transgender VA Veterans is absent from this review; they compared transgender VHA Veterans with a 3:1 matched group of non-transgender VHA Veterans. Brown, G. R., & Jones, K. T. (2016). Mental health and medical health disparities in 5135 transgender veterans receiving healthcare in the Veterans Health Administration: a case–control study. LGBT health, 3(2), 122-131.	Our search results included 2 published articles which used data from the Veterans Aging Cohort Study. Both of these were excluded because they lacked comparisons between groups of interest. The article by Brown et al did not meet inclusion criteria because it lacks comparisons between groups of interest.
	No	Thank you.
	No	Thank you.
	Yes - Given the broad topic area, I Think there is likely many studies that were overlooked. I can think of several studies that were not included, e.g., National Health and Resilience in Veterans Study, NESARC.	We appreciate the opportunity to clarify whether we found articles associated with these 2 national studies. Our search did not find articles using NESARC data, but we note that this study did not report Veteran status. Our search identified 9 articles using data from the National Health and Resilience in Veterans Study, but none met inclusion criteria. Additionally, as part of our original search process, we evaluated whether our search of databases (*eg*, PubMed) resulted in articles using data from multiple other large, national cohorts. We also examined available publication lists found on the websites associated with these cohorts, and performed a limited search of PubMed for articles using data from these cohorts. In general, most articles found through these steps did not meet inclusion criteria (*eg*, did not compare Veterans with non-Veterans). In the Methods and Discussion, we have added information about this further review of cohorts..
	Yes - There were two articles that I felt should have been included, although I don't think their inclusion would make a difference in the overall findings. The first is: Bernard DM, Selden TM (2016). Access to Care Among Nonelderly Veterans, Medical Care 54(3):243-252. They looked at Nonelderly Veterans and comparable non-Veterans using MEPS from 2006 to 2011. Some of their findings included that access barriers are similar for nonelderly Veterans and comparable non-Veterans for dental and prescriptions. Also, uninsured Veterans have better access to medical care than comparable non-Veterans. The	Thank you for your recommendations. Bernard et al 2016, has been added to our included articles. Eibner et al, 2016, is not a peer-reviewed journal article, and thus, is not eligible for inclusion.

	second is by C. Eibner et al (2016). Current and Projected Characteristics and Unique Health Care needs of the Patient Population Served by the Department of Veterans. Rand Health Quarterly 5(4). They found, for example, that VA patients tend to be older and less socioeconomically well off than Veterans who do not rely on VA for care. Also, that Veterans have a higher unadjusted prevalence of diagnosed health conditions than non-Veterans. These may have been excluded for a specific reason and I just missed it in the exclusion criteria.	
	Yes - Journal of Homosexuality Volume 60 (2013) has multiple pertinent articles	Thank you for your suggestion. We reviewed articles in this volume of the Journal of Homosexuality but did not identify any additional articles meeting our inclusion criteria (*eg*, including comparisons between groups of interest).
	Yes - Several studies of non-VA healthcare use by VA enrollees	
	No	Thank you.
Additional suggestions or comments can be provided below. If applicable, please indicate the page and line numbers from the draft report.	Perhaps I overlooked this but the review did indicate the goal is to examine the evidence base for SDH against the complex and essential backdrop formed by age, race/ethnicity, and sex. I didn't see much reference in the results in regards to age and race in the review. Not sure if this is due to lack of data but it would have been helpful to get more information on that.	We appreciate the suggestion to clarify the relationship of social determinants to age, race, and sex, and elaborate on our results in the context of these key demographic characteristics. We revised the Methods and Results to address these topics.
	I commend the authors for their work; this wasn't a small task, and I imagine they must have pored through tomes of articles to distill this report. I offer a few comments in the spirit of strengthening this review and maximizing its impact to VA. 1. There is variability in how Veteran status is defined across studies – especially those from non-VA data sources. For instance, the military service questions have slight variation between NHANES and BRFSS, and the military question in the Women's Health Initiative data used in Lehavot et al. 2016 was "Have you served in the US armed forces on active duty for a period of 180 days or more?" The authors should include this as a limitation, or potentially provide a table of the different ways that Veteran status was measured. An additional limitation inherent to self-reported Veteran status is the inability to corroborate military service with official records. 2. The discussion (and executive summary) would benefit from emphasizing that the scarcity of studies about sexual orientation and gender identity are directly caused by the lack of data systems	1. We agree that there was variation in how Veteran status was ascertained. Overall, articles used either self-reported past service in the military, or administrative data (*eg*, VHA records, registry or roster of Veterans). Large national cohorts of the general US population used self-reported information on service in the military. The questions were slightly different in describing service in the military (*eg*, US armed forces instead of US military) but very similar in general. Some national datasets excluded individuals in active service (*eg*, NHIS), while others obtained more information about current vs past service (*eg*, BRFSS). If we were not certain that the majority of participants were Veterans (*ie*, not on active duty), we excluded these articles. WHI was the only dataset that had a time criterion (*ie*, 180 days of active service) for qualifying as Veteran. For articles using administrative data to identify Veterans, these often used VHA data to identify Veterans. In the

	collecting this information. This report should clearly recommend that if research in this disparities areas is to move forward, systems must collect data about sexual orientation and gender identity. 3. Akin to the preceding point, sexual orientation and gender identity are woefully absent from the "research gaps/future research" section on page 28. Paragraph 2 points out nuances and challenges of rurality and trauma, yet sexual orientation and gender identity are not discussed at all. This section should be expanded to include points about sexual orientation and gender identity in data collection, and the fact that there have been numerous documents about cognitive testing of such items in survey research (as was done somewhat needlessly for NHIS) and best practice documents (2 of which were authored by The Williams Institute). 4. In these times of increasing scrutiny of federally-funded efforts, it may be helpful to couch this review overtly to relevant VA strategic goals, missions, and directives. Specifically, VHA Directive 2013-003 "Providing health care for transgender and intersex Veterans," or the recently issued VHA Directive 1340 "Provision of health care for Veterans who identify as lesbian, gay, or bisexual." While I understand this is an unfortunate, ever-shifting target with the revolving door of political appointees, other guiding VA documents, such as the Blueprint for Excellence or guidelines from Community Care (or whatever the "guiding" document du jour is currently) may help anchor the importance of this synthesis. 5. Page 1, paragraph 2, line 28: it would be helpful to define the 3 prioritized social determinants at their first mention; currently, the three are not defined until the bottom of page 2. 6. Page 1: recommend editing KQ3 to include the definitions of engaged and non-engaged right after they are mentioned; not having these terms defined is confusing to the reader. Although the author provide the definitions following the questions, it would be easier to include like this: “How to engaged (i.e., enrolled in or utilizing VA services) Veterans compare to non-engaged (i.e., not enrolled in VA services) Veterans…” 7. Page 7: PICO should be included in the abbreviations table.	Discussion, we have included more information about the variation in self-reported Veteran status. 2 & 3. We appreciate the suggestions to discuss that lack of evidence on certain social determinants, such as sexual orientation, reflect lack of existing datasets that assess these social determinants. We revised the Discussion to highlight the lack of data on some social determinants, and our recommendation to include consistent assessments for those determinants that are high priority. 4. Thank you for highlighting the connection between our evidence review and the larger VHA mission and policy goals. We revised the Implications for Policy and Practice to include discussion of these connections. 5. Thank you, the 3 prioritized social determinants have been defined in page 1, paragraph 2. 6. Thank you, this clarification has been added to KQ3. 7. Thank you, PICO has been added to the abbreviations table on p. 7.

	It might be helpful if the Introduction (p. 1) defined social determinants more concretely, with the variables introduced in the inclusion criteria briefly outlined (p. 2, lines 32-35). How were these particular social determinants arrived at? What about others, such as housing/homelessness? Housing status is mentioned on p. 4, line 53, but was not specifically defined earlier as a social determinant in the inclusion criteria. Similarly, justice involved appears later in the report but is not outlined in the criteria. Representativeness/coverage, measurement, and funding source were used to determine study quality (p. 3). It remains unclear to me how study quality was rated (e.g., use of a particular scale?) or arrived at. For example, if a study used a nationally representative cohort with standardized measures but was unfunded, would it be considered "medium" (as opposed to "strong") quality? I'm somewhat concerned that using presence of funding to rate study quality may be inappropriate in this context, as much research utilizing publicly available, nationally representative datasets may be done by investigators without funding. In the first paragraph of the Introduction (p.1), the authors state that they were particularly interested in current eras of military service. This did not appear to be discussed in the findings or elsewhere in the report. <u>In Figures 2 and 3</u> (p. 12-13), there is no pathway shown between "access to services and benefits" and "health behaviors," although those two constructs may impact one another. In addition, there is only one directional arrow from "health behaviors" toward "health outcomes." However, one can envision the arrow going in the opposite direction here as well. Indeed, the self-medication hypothesis suggests that mental health symptoms can lead to substance use as a method of coping with negative affect and distress. This bidirectional relationship is shown in Figure 1 but not in Figures 2 and 3. <u>Key Questions 1 & 2</u> In the section on rurality, the authors describe one study with significant interaction effects (p. 20, lines 51-56). This study is mentioned again on p. 26, lines 4-6. If one of the aims is to describe results for the high-priority areas, it would be helpful to include another sentence that	We appreciate the opportunity to clarify our conceptual and analytic frameworks, which we used to guide the development of our search strategy. However, we also included very general terms such as "social" and "residence characteristics," in order to be as broad as possible. Thus, we did not have a certain set of social determinants that had to be addressed, as part of the inclusion criteria. In fact, we allowed for the emergence of social determinants (whether new concepts or new terminology) among included articles, as we abstracted data on social determinants being addressed by these articles. We revised the Methods to provide more detail on the selection of social determinants. We abstracted funding sources in our quality assessments mainly to address potential conflicts of interest. This is a more common concern for studies of interventions, where commercial support for research is more frequent. We did not identify any commercially sponsored work, in our quality reviews of the included articles for rurality, trauma, and sexual orientation. We revised the Methods to reflect why funding source was included. The reference to eras of service has been removed. Although this was originally discussed as informing how the Veteran experience has changed, this was not a major focus of the final evidence review. As noted above, we clarified the development of our conceptual and analytic frameworks, and how they informed each step of our evidence review. We have also revised the Methods to highlight the differences between the conceptual framework (with its more complex and realistic relationships) and the analytic frameworks (which have simplifications that permitted in depth discussions of analytic choices). The article by West et al, 2009 examined interactions between a combined Veteran/VHA-user variable and rural vs urban setting. However, they did not report the magnitude of the interaction effects, and the text

	describes these findings, as it is currently difficult to understand what the interaction effects were. In the section on trauma (p. 21, lines 32-49), the authors describe in detail the study that looked at trauma as a mediating variable but not those that examined it as a moderating variable. The authors might consider briefly describing the findings on moderation, or explain earlier why those are not a focus of the review. In the section on sexual orientation (p. 22, lines 39-43), the article using WHI data to examine mortality did not examine mediation, as the authors note. Nonetheless, the study did find a significant interaction effect for cancer-specific mortality which is not discussed. Specifically, sexual minority women were at greater risk than heterosexual women for cancer-specific mortality, with effects stronger among Veterans compared to non-Veterans (sexual minority x Veteran HR = 1.70, 95% CI: 1.01-2.85). Figures 5 and 6 (p. 19 and 24) – the social determinants outlined here do not fully overlap with the social determinants outlined in the inclusion criteria (which did not include housing status, justice involved, or financial barriers to health care defined separately from income). They also do not include gender identity. The authors may consider demonstrating greater consistency between the social determinants shown in these figures, in Figures 1-3, in Table 1, and in the list of social determinants included in the inclusion criteria. <u>Summary</u> Page 27, lines 31-33: "There were consistent associations of current smoking with prior trauma exposure, whether childhood adversity or adult sexual or physical trauma were examined." The second part of the sentence is unclear; do the authors mean regardless of whether trauma was examined? Relatedly, could they clarify the finding regarding trauma exposure, Veteran status, and smoking – is it that greater exposure to trauma contributed to higher prevalence of smoking among Veterans compared to non-Veterans? In general, it would be helpful to include directionality when describing findings. For example, on p. 28, lines 16-18, the authors state" Overall, we found low strength evidence that there are substantial differences in	describing these results was difficult to interpret and summarize. We have revised the Results to indicate that authors did not report the magnitude of the interaction effect, and we provide the paragraph in question for reviewer: "*Men enrolled in VA care cost substantially more overall than other men who used health care: VA users' averages were about $1,200–2,900 higher, depending on age group and residence. Among men younger than 65 years, urban–rural differences in total expenditures were small for non-Veterans and Veterans not in VA care, but of Veterans who used the VA for any care, urban men averaged about $1,100 more in total annual expenditures than rural men. Among men 65 years or older, rural VA users had the highest average total expenditures, about $250 more than for urban VA users. Regressions using log-transformed expenditures confirmed these differences, revealing significant main effects for Veteran–VA user status (p<0.0001 for either younger or older men) and its interaction with urban–rural residence (p<.05 for younger men; p<.01 for older men…*" For suggestion regarding trauma results on p 21, lines 32-49, we provided more detail in the Methods discussing the conceptual and analytic frameworks, as noted above. We also include more detail on the articles that presented only moderating effects of social determinants. We added a summary of results from Lehavot et al, 2016, regarding interaction between sexual orientation and Veteran status in predicting risk for all-cause mortality, cancer specific mortality, and cardiovascular disease related mortality. As noted above, we have revised the Methods to clarify how social determinants were selected to inform methodologic choices (*eg*, development of search strategy) but did not preclude identification of social determinants not specifically identified before citation screening and full-text review. Additionally, we have

	trauma exposure between engaged and non-engaged Veterans." They might highlight that the differences are such that engaged Veterans report higher levels of trauma exposure than non-engaged Veterans. <u>Appendix C, Table 2</u> Brown, 2016 – non-urban residence for Veterans 23%, non-Veterans 22%, listed as p<.05. Please double-check the p value (this appears like it should be non-significant). <u>Minor</u> -Page 2, line 18: "Two reviewers independently reviewer titles…" – should be "reviewed" -Page 3, line 28 needs a period at the end of the sentence ("…assessed overall strength of evidence") -Page 4, lines 19-20: "…whether there are differences in trauma exposure exist between…" –the word exist can be deleted. -Page 18, lines 32-34, "found insufficient evidence whether…" –the word "on" is needed between evidence and whether. In addition, the term "sexual minority" is used instead of "sexual orientation" and "gender orientation" is used instead of "gender identity" -Page 23, line 30 – add a period at the end of the sentence. -Page 27, line 41-42 "…insufficient evidence whether there are differences in prevalence of sexual minority between…" – include the word "on" between evidence and whether. Sexual minority should be sexual minorities. -Page 28, line 50 – for consistency, use "non-Veteran" instead of nonVeteran -Page 59, line 42 – under "Prevalence, Degree or Level" column, underline "among women" to be parallel to the underline of "among men" in line 48 -Page 61, line 23 – "sexual Orientation" – orientation does not need to be capitalized -Page 72, Prevalence, Degree or Level column – underline "assault," "combat trauma," and "military sexual" for consistency	revised Results to indicate that there was potential for emergent social determinants. The sentence on page 27, lines 31-33, has been clarified to address the reviewer's question. We have reviewed the data for this article in Table 2, Appendix C. The results are statistically significant due to the large sample size. Thank you, these edits have been addressed.
	Overall the review was concise and well-written. I have several areas for clarification: 1. Definition of social determinants, clarification of the phrase "socially constructed". Would also just state that social determinants are responsible for a large portion of health outcomes, not just variation in	1. We clarified our conceptualization of social determinants and revised the Introduction and Methods to address these concerns, per our response to other reviewers. In these revisions, we expand our consideration of age, sex, and race, and why they were

	health outcomes. Classify what is meant by “essential backdrop”? 2. Was neighborhood environment (independent of rurality) included in selection criteria? E.g. census tract information. Would consider this an important health determinant. Could be added to the social determinants model. 3. Delete the phrase: “we believe that” page 6, line 49-50	not the focus of our evidence review. We also note that we considered inclusion of these key demographics as essential for interpretation of results on the role of social determinants in health, and those that report differences in prevalence or levels of social determinants. 2. Our search strategy was designed to search broadly, by including terms such as “social” and “residence characteristics.” We also searched specifically for other terms related to the general environment, including “community resources,” neighborhood,” and “parks.” 3. Thank you, this edit has been made.
	The authors have conducted an admirable fairly comprehensive review, but have chosen to focus on a very broad topic area, perhaps overly broad since social determinants of health encompasses so many psychosocial constructs. One could argue there are other constructs that were not included, such as neighborhood conditions- noise and crime levels, etc. Also it seemed “justice system involvement” was mostly about criminal justice but civil legal problems are also increasingly being considered as important social determinants of health. It's not clear why the authors chose to describe in detail certain constructs, e.g., sexual orientation, trauma, and rurality. Simply examining the prevalence of these characteristics is a bit odd because then this becomes an exercise in comparing vets and non-vets on various identity characteristics instead of the real focus which is on identifying important social determinants of health. In that way, the major aim of the study should be pinpointing the social variables that are most important or influential on health, but instead it seems there is a somewhat distracting focus on prevalence rather than influence/effect. I was surprised at some of the “key messages” from the review for Q1 and Q2. For example, “insufficient evidence to determine whether there are differences in trauma exposure between Veterans and non-Veterans.” Large epidemiological surveys have been conducted that certainly would be available to answer this fairly easily. The conclusion that there is “insufficient evidence on the effects of rurality on differences in health services utilization” is odd since there is a	Thank you. We agree that this evidence review had a very broad scope, in order to address the goals of our VHA partners. We agree that there are valid arguments for including other social determinants, depending on the overall objectives of the review, and the emergence of new social determinants in the future. Our search included other terms related to the general environment, including “community resources,” neighborhood,” and “parks.” We appreciate the opportunity to clarify the prioritization process for selecting which social determinants would undergo a more detailed data abstraction and review. We revised the Methods to address this concern. Our main objective was to describe the evidence base for social determinants that may be particularly relevant for Veterans’ health, as compared with non-Veterans, or for specific groups of Veterans. As such, we anticipated that a large number of identified articles would be descriptive and not necessarily examine the impact of social determinants on outcomes of interest. Because we wanted to capture this larger descriptive evidence base (*ie*, differences in prevalence or levels of social determinant), we did not require results on outcomes of interest for inclusion of articles. As evidence maps are intended to provide a systematic description of the evidence, this helps us understand the state of the field. For example, if trauma exposures are not being

	preponderance of evidence in the general literature on this effect- people in rural areas have less access to all types of services from grocery stores to hospitals. Finally, there were some strange findings that they authors focused on, e.g., “trauma exposure and prevalence of smoking.” This is a somewhat esoteric focus, the relation between trauma exposure and alcohol/drug abuse is much larger and more important. I thought some parts were not particularly well-written and did not synthesize studies well, felt a little bit thrown-together which may reflect the diffused area the review is focused on. There were several typos without, I'll just point out two: Typo on page 2, line 18 “independently reviewer titles” Typo on page 4, line 20 “differences in trauma exposure exist” Also many of the text in the Tables use abbreviations with no footnotes or anything to spell out what the abbreviations mean.	accurately and consistently measured across settings, then we are less able to understand the impact of trauma on health. As noted above in response to other reviewers, we evaluated whether our search results included articles using data from multiple large, national cohorts. We also examined publication lists and bibliographies associated with multiple large cohorts. In the Methods and Discussion, we added information about this additional evaluation and search. Regarding rurality results, we have revised this section to highlight that our main goal was to determine if the evidence indicated that rurality had a differential impact on health care utilization (among other outcomes), when comparing Veterans to non-Veterans. We were not addressing whether rurality impacts utilization in general. Regarding reviewer’s comments about trauma results, we have reframed our key messages. Additionally, we re-examined the reported results on trauma exposure, Veteran status, and the 2 types or health behaviors, smoking and alcohol use. In 4 articles examining trauma exposure on health behaviors, comparing Veterans and non-Veterans, smoking prevalence was significantly higher among those reporting trauma than among those not reporting trauma. However, there was weak evidence as to whether these associations were differential between Veterans and non-Veterans. Binge drinking was also significantly higher among those reporting trauma than among those not reporting trauma, but these associations were weaker than the associations between smoking and trauma. For binge drinking, evidence also did not indicate differential impact of trauma, when comparing Veterans and non-Veterans. Thank you, these edits have been made.
	Page 1: Executive Summary: After the first sentence, it would help to set the stage about how you are defining social determinants of health; provide some examples. At the end of the paragraph, it is stated "evolving socio-cultural context"... please elaborate or state what this is. Also on page 1, it would be better to put what the terms "engaged" and	We appreciate reviewer suggestions to further clarify our work and elaborate on the implications of our results. Specific edits to the text and figures were made as recommended (*eg*, change of the sentence on Page 2, separation of disability and quality of life outcomes in

	"non-engaged" Veterans mean before the Key questions. Page 2: under Study Selection, the first sentence would read better as "Two investigators independently reviewed... " Under Inclusion, here you provide some examples of what you are interested in with regard to social determinant... this should be moved to the introduction section. Page 10: In Figure 1 (and in other subsequent figures), I don't understand why you have listed Disability, quality of life as one outcome. It seems they should be two separate outcomes of interest. Page 11: Before the Key Question section, it would be helpful to know the process involved that you and your stakeholder went through to arrive at these 4 specific key questions. They are good ones, but it would be interesting to have a bit more background surrounding them. Figures on Pages 12 & 13: See comment for page 10. The Results section on pages 17-26 are interesting and the methods used to produce these results seem solid. Page 28: Section on Applicability and Implications for Policy and Practice is under-developed. Page 28-29 Research Gaps/Future Research - would be helpful to have what I would call a "laundry list" of potential studies that should be undertaken in the future. This would be beneficial in setting a research agenda to address the identified gaps.	Figures 1-3). In the Introduction and Methods, we expanded our presentation of social determinants, development of our conceptual framework, the prioritization process, and the populations of interest, as noted above in responses to other reviewers. Thank you. Per our response to other reviewers, we expanded the implications for policy. We appreciate the suggestion to itemize and summarize our recommendations for addressing research gaps, and revised this section.
	I think you should be much clearer about the limitations of this review and your conclusions, given the constraints of your methods. Regarding rurality, for example, your summary states: “Thus, we found moderate strength evidence of no substantial differences in rurality between Veterans and non-Veterans. In contrast, we found insufficient evidence on the effects of rurality on differences in health services utilization, health behaviors, or health outcomes between Veterans and non-Veterans. . . . . [or] between engaged and non-engaged Veterans.”	Thank you for the noted limitation of our evidence review. We revised the Limitations to highlight this aspect of our review.

	A reader might correctly conclude that Veterans and non-Veterans, or engaged vs non-engaged Veterans, are similarly distributed geographically, but then miss the point that rurality does not affect Veterans and non-Veterans differently and incorrectly conclude that there is very little evidence that rurality is associated with utilization, behaviors, or outcomes, when in fact there is a lot of research suggesting so. The reason you found little evidence is that you limited your review to studies that compared Veterans vs non-Veterans, or engaged vs non-engaged Veterans, which yielded very few studies to consider. So you should be very explicit that while the few studies you reviewed did not provide much evidence of rurality effects, there are several other studies that do. Readers should not be led to think that there is no evidence that rural residence affects utilization etc.	
	Just as a point of information, there is a Partnered evaluation Center funded by QUERI and VA Office of Rural Health that examines access to care among rural Veterans and examines the impact of SDOH on various domains of access. this has focused largely on Veterans engaged in VA care because it is challenging to get meaningful data for non-engaged Veterans. I think another conclusion is the need for good data sources on non-engaged Veterans and the challenges this could be given the challenges of linking VA data with other types of data.	We appreciate the suggestion to include the need for better data on Veterans not engaged in VHA services or benefits, and added this to our research gaps section.

APPENDIX C. EVIDENCE TABLES

Appendix C, Table 1. Summary of Characteristics for Included Articles on Veterans and Non-Veterans

Social Determinant	Total Articles	N > 1000	Study Design		Role of Social Determinant in:		
			Cohort	Cross-Sectional	Health Behaviors	Health Services Access or Utilization	Health Outcomes
Education	81	66	28	53	11	10	45
Marital Status	56	46	20	36	7	6	29
Income	51	43	18	33	5	7	21
Employment	46	37	20	26	5	3	22
Rurality	10	9	4	6	1	2	6
Trauma History	11	9	1	10	4	0	7
Social Support	13	9	6	7	2	0	7
Family Socioeconomic Status	10	9	4	6	2	0	6
Justice System Involved	8	6	0	8	1	2	3
Housing Status	6	5	0	6	0	0	2
Sexual Orientation & Gender Identity	2	2	1	1	0	0	1
Financial Barriers to Healthcare	2	1	1	1	1	2	2

Appendix C, Table 2. Detailed Results and Characteristics of Included Articles Addressing Rurality, Trauma, and/or Sexual Orientation for Veterans and Non-Veterans

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Rurality								
Brown, 2016[26]	NLSY 79 (1979-1994) NLSY 97 (1997-2010)	1,914 (11%, 28%, 25 y) 520 (23%, 30%, 21 y)	12.686 (52%, 20%, 25 y) 8,984 (50%,27%, 22 y)	Self-reported urban residence vs not	Non-urban residence: NLSY 79-Veterans 72%, non-Veterans 38% (P<.01); NLSY 97- Veterans 23%, non-Veterans 22% (P<.05)	—	—	—
O'Donnell, 2000[99]	MEPS (1996)	662 (0%, 7%, 72 y)	406 (0%, 16%, 75 y)	Rural=non-MSA	Rural: Veterans 33%, non-Veterans 25% (P=.51)	—	—	Neither Veteran status (P=.9) nor rural residence (P=.9) were significantly associated with odds of self-reported poor/fair mental health

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
West, 2006[129]	BRFSS (2000)	14,389 (0%, 13%, NR)	32,796 (0%, 21%, NR)	Metropolitan=RUC codes 1-3; non-metropolitan=RUC codes 4-9	Non-metropolitan: Veterans 25%, non-Veterans 22%	—	"*Regardless of age or VA patient, other Veteran, or non-Veteran status, metropolitan residents (80.7% overall) were slightly more likely than nonmetropolitan ones (78.6%) to have had a checkup within the past 2 years (P<.01).*"	*"*[M]*etropolitan-nonmetropolitan residence factor did not yield significant effects…"* [on days of poor physical or mental health, or health limiting activities]
Kaplan, 2007[69]	NHIS (1986-1994)	104,026 (5%, 16%, NR)	216,864 (62%, 26%, NR)	Self-reported rural vs urban residence	Rural: Veterans 25%, non-Veterans 23%	—	—	—
White, 2011[132]	NSDUH (2008)	1,985 (0%, 17%, NR)	15,654 (0%, 35%, NR)	MSA: non-metropolitan, small and large metropolitan	Non-metropolitan: Veterans 18%, non-Veterans 16%	—	—	*"*[M]*ilitary status was not significantly associated with suicidal ideation…Additional adjustment for…factors* [including rurality]*…did not materially affect our null finding…"*

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Houston, 2013[63]	Pew Research Center's Internet & American Life Project (2010)	353 (11%, 30%, NR)	2,638 (66%, 46%, NR)	Self-reported rural vs urban status	Rural: Veterans 18%, non-Veterans 16%	—	—	—
West, 2009[130]	MEPS (1996-2004)	12,688 (0%, NR, NR)	35,079 (0%, NR, NR)	Rural=non- MSA	Rural: Veterans 24%, non-Veterans 21%	—	*"*[S]*ignificant main effects* [on total expenditures] *for Veteran-VA user status (p<.001 for either younger or older men) and its interaction with urban-rural residence (P<.05 for younger men; P<.01 for older men…)"*	—
Laudet, 2014[77]	Life in Recovery Survey (2012)	481 (23%, 25%, NR)	2,695 (63%, 17%, NR)	Not described	Rural: Veterans 31%, non-Veterans 26%	—	—	—
McCaskill, 2015[92]	University of Alabama Study of Aging (1999-2009)	301 (0%, 37%,74 y)	200 (0%, 71%, 76 y)	Rural=non-MSA	Rural: Veterans 47%, non-Veterans 58%	—	—	—

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Ajmera, 2011[14]	MCBS (2001-2005)	NR (unclear # participants)	NR (unclear # participants)	Non-metro= non-MSA	Unable to abstract due to unclear # participants	—	—	Neither Veteran status nor non-metro residence were significantly associated with odds of having any hospitalization due to ambulatory care sensitive conditions
Bernard, 2016[142]	MEPS (2006-2011)	6268 (10%, NR, 50 y)	105,681 (53%, NR, 40 y)	MSA vs non-MSA	Non-MSA: Veterans 18%, non-Veterans 15% (comparisons made for each region, Midwest, *etc*, all non-significant)	—	—	—
Trauma								
White, 2012[131]	Survey of arrestees Maricopa County, AZ (2009)	132 (8%, 39%, 42 y)	1,970 (25%, 55%, 32 y)	Self-reported "victimized" in past 12 months	Victimized: Veterans 42%, non-Veterans 38%	Self-reported & urine results of illicit drug use in past 12 months No significant associations for Veteran status or being victimized for any drug outcome	—	—

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Schultz, 2006[111]	Survey of Veterans in Minneapolis VHA Women's Clinic, and non-Veteran women in Michigan (2005)	142 (100%, 7.8%, 45 y)	81 (100%, 13%, 35 y)	Self-reported sexual trauma in childhood or adulthood	Childhood sexual abuse: Veterans 43%, non-Veterans 49% Adult sexual victimization: Veterans 58%, non-Veterans 67% Adult sexual assault: Veterans 22%, non-Veterans 49% (P<0.001)	—	—	—
Naifeh, 2008[96]	Medical records of Veterans getting PTSD treatment at 1 Mid-western VHA facility (2000-2003), and non-Veteran crime victims in mental health treatment	191 (8%, 16%, 52 y)	48 (94%, 36 y)	Various types of trauma experiences documented in medical records	Sexual assault: Veterans 10%, non-Veterans 52% Physical assault: Veterans 7%, non-Veterans 31%	—	—	—

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Dichter, 2011[34]	BRFSS (2006-2008), limited to states with IPV module	503 (100%, 36%, NR)	20,659 (100%, 27%, NR)	Self-reported lifetime IPV	IPV: Veterans 34%, non-Veterans 24% (P<.01)	Self-reported smoking, binge or heavy drinking, and lack of exercise Multivariable analyses modeled associations of IPV with behavior outcomes, controlling for Veteran status: OR 2.8 (95% CI 2.4, 3.2) for smoking, OR 1.8 (95% CI 1.5, 2.1) for drinking, OR 1.1 (95% CI 0.9, 1.2) for lack of exercise	—	Depression defined by ≥10 on PHQ-8 Multivariable model of association between IPV and depression, controlling for Veteran status, OR 3.8 (95% CI 3.2, 4.5)

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Cerulli, 2014[27]	BRFSS BRFSS (2006-2008), limited to states with IPV module	4,738 (0%, 20%, NR)	8,998 (0%, 29%, NR)	Self-reported lifetime IPV	IPV: Veterans 10%, non-Veterans 13% (P<.01)	Self-reported smoking, binge or heavy drinking, and lack of exercise Multivariable analyses modeled associations of IPV with behavior outcomes, stratified by Veteran status—among Veterans, OR 1.9 (95% CI 1.3, 2.8) for smoking, OR 1.4 (95% CI 0.9, 2.2) for drinking, OR 1.3 (95% CI 0.8, 1.9) for lack of exercise; among non-Veterans, OR 2.0 (95% CI 1.6, 2.6) for smoking, OR 1.7 (95% CI 1.3, 2.2) for drinking, OR 0.7 (95% CI 0.5, 0.9) for lack of exercise	—	Depression defined by ≥10 on PHQ-8 Multivariable model of association between IPV and depression, stratified by Veteran status—among Veterans OR 2.6 (95% CI 1.5, 4.6); among non-Veterans OR 4.4 (95% CI 2.8, 6.9)

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Blosnich, 2014[22]	BRFSS (2010-2010), states with ACEs module	9232 (8%, 13-18%, NR)	51146 (70%, 20-21%, NR)	ACEs	Comparisons stratified by sex and "all-volunteer" vs "draft" eras—among men, higher prevalence of all categories in Veterans compared with non-Veterans during "all-volunteer" but not in "draft" era; among women, higher prevalence of some categories in Veterans compared with non-Veterans, largely the same for both eras of service	—	—	—
Hammett, 2015[53]	Smokers from Homelessness in Minnesota Survey (2009)	351 (10%, 47%, 47 y)	2,831 (50%, 61%, 36 y)	Self-reported childhood physical or sexual abuse, adult relationship abuse in past 12 months	Childhood abuse: Veterans 39%, non-Veterans 44% (P=.06) Adult relationship abuse: Veterans 16%, non-Veterans 25% (P<.001)	—	—	—

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
McCauley, 2015[93]	BRFSS (2010-2011), states with ACEs module	631 (100%, 15%, 51 y)	35.854 (100%, 16%, 49 y)	ACEs, items grouped by types of adversity: household dysfunction, and childhood abuse (*ie,* physical, emotional, and sexual abuse)	Household dysfunction: Veterans 20%, non-Veterans 21% (p=0.71) Childhood abuse: Veterans 11%, non-Veterans 9% (p=0.22) Mean number of ACEs: Veterans 2.3, non-Veterans 1.7 (p<0.01)	Smoking and heavy alcohol use Serial multivariable models examined association of Veteran status with behaviors, and changes in associations after inclusion of ACEs—OR for smoking before ACEs 1.84 (95% CI 1.18, 2.88) and after ACEs 1.57 (95% CI 0.96, 2.58); OR for drinking before ACEs 1.35 (95% CI 0.77, 2.36) and after ACEs 1.31 (95% CI 0.73, 2.35)	—	Diabetes, cardiovascular disease, asthma, and disability Serial multivariable models examined association of Veteran status with health outcomes, and changes in associations after inclusion of ACEs—no significant association between Veteran status and any outcome, except for disability, with OR before ACEs 1.83 (95% CI 1.08, 3.10) and after ACEs 1.57 (95% CI 0.90, 2.75)
Winkleby, 1993[137]	Residents of 3 National Guard Armories in Santa Clara, CA (1989-1990)	250 (0%, 41%, NR)	585 (0%, 45%, NR)	Self-reported childhood sexual or physical abuse	Sexual abuse: Veterans 6-8%, non-Veterans 5% (p=0.33) Physical abuse: Veterans 15-16%, non-Veterans 12% (p=0.27)	—	—	—

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Katon, 2015[70]	BRFSS (2011-2012), states with ACEs module	13321 (8%, 17%, NR)	88295 (68%, 20%, NR)	ACEs	Stratified by sex— mean ACEs among women: Veterans 2.2, non-Veterans 1.6 (p<0.001) mean ACEs among men: Veterans 1.7, non-Veterans 1.3 (p<0.001) Patterns of higher prevalence among Veterans also generally true for specific items	Smoking and binge drinking Multivariable analyses modeling association between number of ACEs and behaviors, stratified by sex and Veteran status, generally very small significant effects (RR range 1.04-1.14) in all groups, except for drinking in male Veterans (RR 0.95 [95% CI 0.82, 1.08])	—	QOL as self-perceived poor/fair health, days of poor physical health, and days of poor mental health Multivariable analyses modeling association between number of ACEs and QOL, stratified by sex and Veteran status, generally small significant effects in all groups (RR range 1.10-1.30); among men, also significant interactions between ACEs and Veteran status for all QOL outcomes
Sexual Orientation								
Lehavot, 2014[80]	NHANES (1999-2010)	151 (100%, 52%, 41 y)	8,738 (100%, 48%, 40 y)	Self-reported minority sexual orientation (*ie,* non- heterosexual)	Minority sexual orientation: Veterans 7%, non-Veterans 5% (p=0.51)	—	—	—
Trauma & Sexual Orientation								

Author, Year	Data Source (Year)	*N* Participants (% Women, % Non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Veterans	Non-Veterans	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Lehavot, 2016[82]	WHI (1993-2014)	3433 (100%, 11% 64 y)	134206 (100%, 15%, 60 y)	1) Self-reported minority sexual orientation (*ie,* non-heterosexual) 2) Physical abuse, verbal abuse, or "other trauma" in past year	Sexual minority: Veterans 4%, non-Veterans 1% Physical abuse: sexual-minority Veterans, heterosexual Veterans and non-Veterans all 1%, sexual-minority non-Veterans 2%(p=0.004) Verbal abuse: Veteran groups both 10%, heterosexual non-Veterans 11%, sexual minority non-Veterans 15% (p < 0.001) "other trauma": sexual minority Veterans 7%, heterosexual Veterans 8%, sexual minority non-Veterans 10%, heterosexual non-Veterans 7% (p < 0.001).	—	—	All-cause mortality (fully adjusted models): Veteran status HR 1.14 (95% CI 1.06, 1.22) Sexual minority status HR 1.20 (95% CI 1.07, 1.36) Separate models examined role of trauma in 4 groups defined by Veteran status and sexual orientation: no significant HR for physical abuse except among heterosexual non-Veterans (HR 1.17 [95% CI 1.02, 1.33]), no significant HR for verbal abuse in any group, and no significant HR for "other trauma" except among sexual minority Veterans (HR 4.31 [95% CI 1.38, 3.47])

ACEs=Adverse Childhood Experiences (11 items); BRFSS=Behavioral Risk Factor Surveillance System; HR=hazard ratio; IPV=intimate partner violence; MCBS=Medicare Current Beneficiary Survey; MEPS=Medicare Expenditure Panel Survey; MSA=Metropolitan Statistical Area (US Office of Management and Budget); NR= not reported;

NHANES= National Health and Nutrition Examination Survey; NHIS=National Health Interview Survey; NLSY=National Longitudinal Survey of Youth; NSDUH=National Survey on Drug Use and Health; PHQ-8=Patient Health Questionnaire (8 items); QOL= health related quality of life; RR=relative risk; RUC=Rural-Urban Continuum (US Department of Agriculture); WHI= Women's Health Initiative

Appendix C, Table 3. Summary of Characteristics for Included Articles on Veterans Engaged and Not Engaged in VHA Services

Social Determinant	Total Articles	N > 1000	Study Design		Role of Social Determinant in:		
			Cohort	Cross-Sectional	Health Behaviors	Health Services Access or Utilization	Health Outcomes
Education	25	21	4	21	1	8	5
Marital Status	23	19	3	20	0	9	3
Income	27	23	3	24	1	9	5
Employment	21	15	3	18	1	6	2
Rurality	13	9	9	4	0	2	2
Trauma History	6	2	0	6	0	0	0
Social Support	2	2	0	2	0	0	0
Family Socioeconomic Status	2	2	0	2	1	0	1
Justice System Involved	2	0	0	2	0	1	0
Housing Status	3	3	1	2	0	0	0
Sexual Orientation & Gender Identity	0	0	0	0	0	0	0
Financial Barriers to Healthcare	0	0	0	0	0	0	0

Appendix C, Table 4. Detailed Results and Characteristics of Included Articles Addressing Rurality, Trauma, and/or Sexual Orientation for Veterans Engaged and *Not* Engaged in VHA Care

Author, Year	Data Sources (Year), Definition of Engaged	*N* Veterans (% Women, % non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Engaged	*Not* Engaged	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Rurality								
West, 2006[129]	BRFSS (2000), self-reported VHA utilization in past year	1928 (0%, 21%, NR)	12461 (0%, 11%, NR)	Metropolitan= RUC codes 1-3; non-metropolitan= RUC codes 4-9	Non-metropolitan: Engaged 30%, not engaged 24%	—	"*Regardless of age or VA patient, other Veteran, or non-Veteran status, metropolitan residents (80.7% overall) were slightly more likely than nonmetropolitan ones (78.6%) to have had a checkup within the past 2 years (P < .01).*"	"[M]*etropolitan-nonmetropolitan residence factor did not yield significant effects…*" [on days of poor physical or mental health, or health limiting activities]
Kramer, 2016[74]	IHS and VHA data (2001-2003), only VHA utilization (vs only IHS)	18336 (8%, 100%, 56 y)	30023 (7%, 100%, 53 y)	Rurality based on RUC	Rural: Engaged 18%, not engaged 28%	—	—	—
McCarthy, 2009[91]	VA National Psychosis Registry and VHA utilization data (FY 2001-2004), use of intensive outpatient mental health case management	452 (12%, 44%, 56 y)	6088 (7%, 43%, 52 y)	Calculated straight-line miles from "population centroid" of zip code of residence to nearest VHA facility with intensive case management team	Median miles to nearest VHA case management team: Engaged 16, not engaged 46	—	—	—
French, 2012[40]	VHA and Medicare fee-for-service (2007), cataract surgery at VHA	20191 (2%, 12%, NR*)	137726 (8%, 7%, NR*)	4 categories based on zip code approximations of census RUCA codes:	Isolated small rural town: Engaged 8%, not engaged 8%	—	—	—

Author, Year	Data Sources (Year), Definition of Engaged	*N* Veterans (% Women, % non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Engaged	*Not* Engaged	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
	(vs Medicare paid) among dual enrollees			1) urban, 2) large rural city/town, 3) small rural town, 4) isolated small rural town	Small rural town: Engaged 9%, not engaged 9%			
Blackstock, 2012[19]	VHA data (FY 2002-2009), any use of VHA homeless services	7431 (13%, 51%, NR)	445319 (12%, 38%, NR)	Rural= all 3 non-urban categories based on zip code approximations of census RUCA codes	Rural: Engaged 15%, not engaged 21%	—	—	—
Kramer, 2011[75]	IHS and VHA data (FY 2002-2003), only VHA utilization (vs only IHS)	6947 (unable to abstract due to extensive errors in data table)	6500 (unable to abstract due to extensive errors in data table)	Rurality based on RUC	(unable to abstract due to extensive errors in data table)	—	—	—
Houston, 2013[63]	Pew Research Center's Internet & American Life Project (2010) , self-reported VHA utilization in past year	92 (16%, 36%, NR)	261 (9%, 25%, NR)	Self-reported rural vs urban status	Rural: Engaged and not engaged both 18%	—	—	—
French, 2012[41]	VHA and Medicare fee-for-service (2008), radiation therapy at VHA (vs Medicare paid) among dual enrollees	4646 (1%, NR, NR*)	137726 (2%, NR, NR*)	4 categories based on zip code approximations of census RUCA codes: 1) urban, 2) large rural city/town, 3) small rural town, 4) isolated small rural town	Isolated small rural town: Engaged 6%, not engaged 7% Small rural town: Engaged 6%, not engaged 8%	—	—	—

Author, Year	Data Sources (Year), Definition of Engaged	*N* Veterans (% Women, % non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Engaged	*Not* Engaged	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Gorman, 2016[48]	Survey of National Guard soldiers in Michigan (2011-2013), utilization of any VHA mental health services	327 (7%, 23%, NR)	1099 (9%, 15%, NR)	Rural=non- MSA	Rural: Engaged 14%, not engaged 16%	—	—	—
West, 2009[130]	MEPS (1996-2004), self-reported VHA utilization	4990 (0%, NR, NR)	7698 (0%, NR, NR)	Rural=non- MSA	Rural: Engaged 27%, not engaged 23%	—	*"*[S]*ignificant main effects* [on total expenditures] *for Veteran-VA user status (p<.001 for either younger or older men) and its interaction with urban-rural residence (p<.05 for younger men; p<.01 for older men…)"*	—
Hynes, 2007[66]	VHA, VBA, and Medicare fee-for-service (1997-1999), utilization of only VHA (vs only Medicare-paid) outpatient services	270993 (2%, NR, NR*)	524678 (2%, NR, NR*)	Rural or urban using VHA classification	Rural: Engaged 21%, not engaged 19%	—	—	—
Ajmera, 2011[14]	MCBS (2001-2005), at least 1 hospital-ization, >1/3 outpatient visits, or >1/3 prescriptions paid by VHA	NR (unclear # participants)	NR (unclear # participants)	Non-metro= non-MSA	Unable to abstract due to unclear # participants	—	—	Neither VHA use nor non-metro residence were significantly associated with odds of having any hospitalization due to ambulatory care sensitive conditions
Trauma								

Author, Year	Data Sources (Year), Definition of Engaged	*N* Veterans (% Women, % non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Engaged	*Not* Engaged	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
Lehavot, 2015[81]	Internet survey of women Veterans with over-sampling of lesbian and bisexual population (2013), self-reported VHA use in past year	339 (100%, 17%, 47 y)	278 (100%, 13%, 52 y)	Self-reported childhood abuse, non-military adult sexual assault or physical victimization, military combat, military sexual harassment, assault, or physical victimization	Childhood abuse: Engaged 68%, not engaged 67% Non-military adult sexual assault: Engaged 41%, not engaged 28% (p <.001) Non-military adult physical victimization: Engaged 73%, not engaged 55% (p <.001) Military sexual harassment: Engaged 81%, not engaged 68% (p <.001) Military sexual assault: Engaged 48%, not engaged 28% (p <.001) Military physical victimization: Engaged 66%, not engaged 43% (p <.001)	—	—	—
Hamilton, 2013[52]	National Survey of Women Veterans (2008-2009), self-reported	2065 (100%, 35%, NR)	626 (100%, 26%, NR)	Self-reported military sexual assault	Military sexual assault: Engaged 20%, not engaged 9% (p=.002)	—	—	—

Author, Year	Data Sources (Year), Definition of Engaged	*N* Veterans (% Women, % non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Engaged	*Not* Engaged	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
	current VHA use							
Gamache, 2000[45]	Survey of homeless Veterans in 9 states (1995-1998), self-reported ever VHA use	390 (8%, 54%, 44 y)	308 (8%, 46%, 41 y)	Vietnam war-zone service	Vietnam war-zone: Engaged 32%, not engaged 16% ($p < .001$)	—	—	—
Ryan, 2015[108]	Survey of women OEF/OIF/OND Veterans in VISN 1 (2013-2014), self-reported current VHA use	49 (100%, 12%, 36 y)	82 (100%, 23%, 37 y)	Combat trauma by 17-item Combat Experiences Scale (CES) and 13-item Aftermath of Battle Scale (ABS); military sexual trauma by 8-item Sexual Harassment Scale (SHS)	Combat trauma: Engaged mean CES 25 (SD=12) and mean ABS 27 (SD=17), not engaged mean CES 21 (SD=6) and mean ABS 22 (SD =12), p=.04 for CES and p<.001 for ABS Military sexual trauma: Engaged mean SHS 2 (SD=4), not engaged mean SHS 0.8 (SD=2)	—	—	—
Rurality & Trauma								
Ouimette, 2003[100]	National sample from NRWV (1997), self-reported VHA use in past 2 y vs no use ever	543 (100%, 31%, NR)	529 (100%, 31%, NR)	1. Self-reported residence in city/suburb, large town, or small town/rural area 2. Combat, military sexual harassment, military sexual	Small town/rural: Engaged 6%, not engaged 7% Combat: Engaged and not engaged, both 8%	—	—	—

Author, Year	Data Sources (Year), Definition of Engaged	*N* Veterans (% Women, % non-White, Mean Age)		Social Determinant		Role of Social Determinant in:		
		Engaged	*Not* Engaged	Main Measure(s)	Prevalence, Degree, or Level	Health Behaviors	Health Services Access/ Utilization	Health Outcomes
				assault, "other military trauma"	Sexual harassment: Engaged 47%, not engaged 45% Sexual assault: Engaged 21%, not engaged 15% "other military trauma": Engaged 60%, not engaged 61%			
Simpson, 2013[113]	Targeted survey of sexual minority and trans-gendered Veterans (2004-2005), self-reported lifetime VHA use	162 (35%, 12%, 47 y)	194 (27%, 12%, 44 y)	1. Self-reported residence in town with <50,000 population 2. Military *…interpersonal traumas perceived* [as being] *due to their sexual orientation…"*	Town < 50,000: Engaged 25%, not engaged 26% Military trauma related to sexual orientation: – Engaged 51%, not engaged. 43% (p <0.10).	—	—	—

BRFSS=Behavioral Risk Factor Surveillance System; CI=confidence interval; IHS= Indian Health Service; MEPS=Medicare Expenditure Panel Survey; MSA=Metropolitan Statistical Area (US Office of Management and Budget); NR= not reported; NRWV=National Registry of Women Veterans; OEF/OIF/OND=Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn (wars in Iraq and Afghanistan);RUC=Rural-Urban Continuum (US Department of Agriculture); RUCA=Rural-Urban Commuting Area (US Department of Agriculture); SD=standard deviation