

Community-Based Yoga for Women Undergoing Substance Use Disorder Treatment: A Descriptive Study

Abstract

Background: Women with substance use disorders (SUD) receive medication-assisted treatment (MAT) with behavioral interventions and counseling for recovery. Evidence supports the use of yoga for SUD; however few studies specifically feature women. **Objectives:** Community-based yoga may add to health promotion through preferable physical activity for women in recovery. The aims of this study are to explore demographics and quantitative measures relevant to recovery and capture and understand the subjective experience of one session of yoga. **Study Design:** The study design involves Descriptive/Cross-sectional. **Methodology:** Women in an inpatient SUD center attending weekly optional off-site yoga for recovery were recruited to capture first-time attendance. Survey data included Medical Outcomes Survey 12-item short-form (SF-12), Toronto Mindfulness Scale (TMS), and Brief Resilience Scale (BRS), demographics, and narrative reflections. Recruitment opportunities occurred weekly during ongoing hour-long classes. **Results:** Twenty-nine women (average age 36.6) with primarily opiate-based addictions completed surveys. SF-12 was below the normative value of 50 for both subscales. BRS scores showed averages on the low end of normal resiliency. The frequency of responses to writing prompts confirmed physical and mental well-being through yoga intervention. Women shared potential relapse prevention specifically attributed to the mindfulness component of the intervention. **Conclusion:** The SF-12, BRS, and TMS are brief, valid, and reliable and can be easily incorporated in clinical practice or future research. Suboptimal SF-12 scores were found in women with SUD and, therefore important to note in the context of recovery to optimize treatment. Subjective reports from the participants find community-based yoga an enjoyable and beneficial type of physical activity. Yoga may be a viable option for comprehensive mind-body intervention for this population.

Keywords: *Interprofessional, mindfulness, opioid, pain*

Introduction

There is an estimated 1.7 million people who are currently suffering from substance use disorders (SUDs) from prescription opioid pain relievers and another 652,000 from heroin use in the United States alone.^[1] Over 26% of adults aged 18 and over report binge or heavy alcohol use in the past month.^[2] Among adults in the US, 49.1 million report currently utilizing tobacco products.^[3] SUD is concerningly prevalent in our modern societies, with SUD diagnosis criteria including 2 or more of the following within a 12 month period: hazardous use, social/interpersonal problems related to use, neglect of major roles, withdrawal, tolerance, use of larger amounts/longer, repeated attempts to quit/control use,

much time spent using, activities given up, cravings and physical/psychological problems related to use.^[4]

According to the National Institute on Drug Abuse, in 2018, 19.5 million women used illicit drugs in the past year.^[5] Specific tailored treatment, differing from the male-based standard of care, is necessary to address the complex needs of females with SUDs.^[6] This spans differences based on biological sex, including metabolic response to pharmacologic agents,^[7] and gender-based cultural views, for example, including provisions for childcare or safety in the context of domestic violence.^[6] Negative self-body image, anxiety, depression, and decreased self-awareness, including the ability to properly manage one's thoughts and emotions, have been found to be related to addiction and relapse in this unique population.^[8]

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This substance misuse epidemic challenges health-care professionals (HCP) to promote health and wellness topics while addressing health concerns with SUD common in the general public. Physical activity and exercise have been shown to assist in the physical improvement and mental well-being among those recovering from SUD.^[9,10] HCPs are uniquely poised to educate for the benefits of physical activity alongside overall health promotion efforts. Given the increased awareness of health disparities and social determinants of health, HCPs must leverage knowledge of available community resources and engage in interprofessional collaborations to rise to this challenge.^[11] While cooperation between different types and scopes of organizations and professions can be challenging, the likelihood of access to disparity reducing services and the potential for long-term wellness is dependent on cross-collaborative efforts for those with SUD.^[12]

Current evidence-based treatment for SUD utilizes medication-assisted treatment (MAT), which features pharmacological efforts to reduce and control side effects, generally in combination with behavioral therapy, counseling, and patient monitoring.^[13] Counseling and behavioral therapy is considered a requirement for SUD treatment, as it effectively promotes mindful contingency management and addresses underlying mental health issues, with community support promoting better outcomes in recovery.^[14,15] Twelve-step programs may contribute to this component in the pursuit of recovery and are found to accommodate persistent pain and a variety of SUD types.^[16] While the definition of recovery is debated, the Substance Abuse and Mental Health Services Administration (SAMHSA) provides a working definition as “*A process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential.*”^[17] “SAMHSA” further identifies four supportive dimensions as health (mental and physical), stable and safe home, meaningful purpose, and community support and relationships.^[17]

Yoga can be defined as the practice of mindfulness through breathing, physical postures and movement, and meditation. This cohesively aligns with multiple theorized components of recovery.^[18] Increased mindfulness and recognition of one’s emotions as they are is a potential outcome of this practice and has been shown to be beneficial in emotional, stress, and pain responses. Current research theorizes yogic skills in mindfulness target multiple processes, ranging from physiologic to psychologic, implicated in SUDs.^[18] Recent studies have demonstrated the addition of multiple types of yoga for the prevention of relapse,^[19] and may have a longer-lasting effect in addition to or in combination with standard SUD treatment methods.^[20]

However, there is a paucity of literature specifically featuring women-only or gender-based sub-analysis, with the majority of research on yoga for SUD focusing on

men or omitting gender-specific analysis.^[19] In addition, yoga has been shown to be self-selected as the physical activity of choice by women, more often than men, while in treatment of SUD.^[21] Given the awareness of the unique needs of women with SUDs,^[6] mindfulness practices and physical activity featuring yoga requires further specific investigation for this population.

With the paucity of literature featuring women only in yoga-based clinical trials for this SUD population, this study focuses specifically on women in SUD treatment, opting to attend a community-based yoga class, to further explore the potential role of yoga in their recovery-based health and wellness. The primary rationale for this study is to explore demographics and quantitative measures relevant to sustainable recovery (quality of life [QOL], mindfulness, and resilience) in these women. The secondary aim was to capture and understand the subjective experience of a single session of yoga by women undergoing SUD treatment.

Methodology

Participants

Participants were recruited through an inpatient women’s SUD center attending a weekly optional offsite yoga session for recovery. These women were receiving standard MAT/cognitive behavioral therapy as part of their inpatient SUD treatment, and access to the weekly offsite yoga class was available to all with voluntary participation. Ongoing recruitment took place over 16 weeks between May and August 2019 and participation in the study was voluntary. This study was approved through the Institutional Review Board process. Demographic, survey data, and narrative reflections were anonymously collected with initial participation in any aspect of one yoga session.

Procedures

All women who opted to attend the existing weekly yoga session were invited to complete surveys and respond to questions regarding the perceived experience of their first session. Forms returned without an identifier were excluded. On completion of the informed consent form, intake surveys included demographic data and the Medical Outcomes Survey 12-item short-form (SF-12), Toronto Mindfulness Scale (TMS), and Brief Resilience Scale (BRS), all tested for validity and reliability. All surveys and responses to questions were identified by a chosen initial and age and were completed in <10 min. This time restriction complied with guidelines as determined by the inpatient facility. Measures and writing prompts were necessarily brief by design and were chosen specifically to accommodate the available timeframe with the least intrusion into the yoga session.

The Medical Outcome Survey SF-12 questionnaire measures domains of QOL and ascertains physical composite score and mental composite score (PCS and

MCS).^[22] PCS and MCS were computed using the rating on 12 questions from 0 to 100, where a 0 score indicates the lowest level of health and 100 indicates the highest level, with a national mean score of 50. This measure has been widely recognized in the literature and used in previous yoga-based studies with good psychometric properties, including Cronbach's alpha coefficients of 0.72–0.89.^[23,24]

The Brief Resilience Scale (BRS) is a 6 question self-report measure with good psychometric properties of internal consistency and test–retest reliability. This measure captures coping, health, personal characteristics, and social relations, with negative relations with anxiety, depression, negative affect, and physical symptoms.^[25] While there is no “gold standard” for assessment of resiliency, the BRS was found valuable for its brevity while retaining high psychometric ratings in comparison to other resiliency measures, including Cronbach's alpha coefficients between 0.70 and 0.95.^[26] Overall, higher scores indicate greater resiliency, with a range of 1.00–5.00. Ranges from 1.00 to 2.99 indicate low resilience, 3.00–4.30 is normal resilience, and 4.31–5.00 is high resilience.^[27]

The TMS is a 13-item questionnaire which measures “state-like” experiences and responses *during* meditation, rather than “trait-like” dispositions that might reflect the cognitive processes of meditation.^[28] The two subscale components represent curiosity and decentering. Centering measures one's rising thoughts, feelings, or emotions. Decentering reflects the awareness of one's own experiences.^[29] Each question is rated on a Likert scale of 0–4, with zero representing “Not at all” and 4 the highest score of “Very much.”^[29] Overall range of scoring is 0–24 for Curiosity and 0–28 for Decentering, with higher values generally indicating a more mindful state.^[30] The TMS has good internal consistency (Cronbach alpha coefficient 0.95) and the decentering subscale has good incremental validity in terms of perceived stress and distress.^[28] Overall the TMS is a valid and reliable source to measure mindfulness, with recognition in the literature, despite no existing normative values.^[28]

Writing prompts cued participants to reflect on the experience and impact of the yoga class for their ongoing recovery. Postclass journaling invited current pain levels and perspectives on the yoga intervention, along with subcomponents on physical exercise and meditation/mindfulness, for efficacy in this modality as an adjunct to other treatment.

1. *How does yoga impact your experience in the recovery program?*
2. *Do you believe that yoga will have an impact of your ability to stay in recovery after completing the program? Why or why not?*
3. *Do you believe that physical exercise will have an impact on your ability to stay in recovery after completing this program? Why or why not?*

4. *Do you believe that mindfulness will have an impact on your ability to stay in recovery after completing this program? Why or why not?*

Yoga intervention

Yoga classes were based on hatha principles, encompassing breathing, strengthening, and meditation that are beneficial for use in SUD.^[18-20] The sequence utilized was an unheated beginner Baptiste “*Journey into Power*” and included hatha yoga components of physical movement and poses, breathwork, and mindfulness/meditation with inquiry. Sessions were 50–60 min, to permit time for surveys and open-ended journaling. Class was conducted with trauma-informed principles, as recommended in the literature to create a safer environment for these women to optimize benefit and lessen potential negative triggers or responses toward peaceful embodiment.^[31] “*Trauma-informed yoga is adapted to the unique needs of individuals working to overcome trauma, may ameliorate symptoms by creating a safe, tailored practice for students to learn how to respond, rather than react, to symptoms and circumstances.*”^[32] The 12-step program principles were embedded in each class for congruency with inpatient rehabilitation concepts,^[16] which can be summarized as admitting powerlessness over drugs/alcohol, taking an honest, moral inventory, admitting the nature of their wrongs, making a list of those harmed, making amends where possible, seeking help from a sponsor or mentor, and committing to service.^[33]

Modifications and a variety of props, including chairs, blocks, bolsters, and blankets, were freely available during all classes to safely optimize participation by attendees. The session instructors were certified yoga teachers with ongoing successful, sustained personal recovery from SUD. Instructors offered written references of the yoga sequences for continued independent yoga practice. In addition to the ongoing weekly class offered only to this inpatient facility, the yoga studio hosting the study provides multiple venues and options for yoga for recovery, including classes held in local “recovery/drug court” and free community classes, for ongoing support. Considering the COVID-19 pandemic, the studio pivoted to offer Internet-based classes via Zoom and social media.^[34]

Data analysis

Descriptive statistics were reported in aggregate consistent with STROBE guidelines.^[35] [Appendix A] Data were analyzed using Microsoft Excel version 16 and all data with participant identifiers was included. The frequency of responses from narratives was an iterative process with responses transcribed and coded by four members of the research team. The frequency of responses was determined independently with confirmation of findings and grouped by topic, with supportive quotes.

Results

Quantitative findings

Full results on demographics include reference to unanswered items or any missing data, reflecting the response rate and the voluntary nature of this study [Table 1]. The participants included 29 women between the ages of 21–60, and 76% Caucasian, 21% African American/Black, and 7% Hispanic/Latino. Sixty-five percent completed high school or United States High School Equivalency/ General Education Development Certificate (GED), with 41% attended vocational/technical training. Nine percent attended 2–4 years of college and 93% self-reported as unemployed during their inpatient rehab. Sixty-two percent had at least one child, with a range of the number of children from 1 to 5. Length of addiction ranged from 5 to 30 years, with an average of 13.9 years. More than a third of the participants (37%) reported experiencing 3–5 relapses. The predominant drug of choice was opiates (70%) followed by cocaine/crack cocaine (51%). Fifty-two percent currently reported pain, yet only 28% had been referred for medical rehabilitation services in the past.

Quantitative results [Table 2] revealed participants had lower averages on the SF-12, with 96% response rate, compared to normative values of 50 for both physical and mental sub-scores. Brief Resilience Scale scores showed that averages were on the lower end of the normal limits of resiliency, with 86% response rate. The same response rate was noted in TMS. The curiosity and decentering sub-scales of the TMS were in the upper quartile range, indicating heightened mindfulness after yoga practice.

Response from writing prompts

Of the 29 participants, 7 indicated they were completely naïve to yoga at the time of data collection, with two having overt prior yoga experience or practice. Seventeen responses were unclear as to prior yoga experiences, with 3 abstaining from narrative response.

Participants stated yoga provided an experience of relaxation, stillness, calming, and groundedness (10/29). Acquired coping techniques included breathing, mindfulness, meditation, and centering (8/29). Perception of well-being improved for 9/29 (2/29 specifically reduced in pain and 2/29 specifically reduced anxiety).

“I feel like when I’m inwardly centered and balanced that reflects outwardly in what I do”

“Develop mindfulness techniques and learn to be still”

“It has a positive impact-helps me relax and round out my exercise program”

When asked if yoga will have an impact on sustained recovery, most felt it supported their mental well-being, including staying positive, peaceful, mindful with

decreased anxiety, and feeling hopeful and good about oneself (15/29).

Table 1: Demographics

Demographics	Variables	n (%)
Mean age, years (range minimum-maximum)		36.66 (21-60)
Self-identified race/ethnicity	Caucasian/white	22 (76)
	Black/African American	6 (21)
	Hispanic/Latino	2 (7)
	Christian/catholic	13 (45)
Religion	Muslim	2 (7)
	Jewish	1 (3)
	Buddhist	1 (3)
	No specific religion	9 (31)
	No response	3 (10)
	Education level	<12
12/GED		19 (65)
Vocational technical training		12 (41)
2 year college		1 (3)
4 year college		2 (6)
Employment	Employed	1 (3)
	Unemployed	27 (93)
	No response	1 (3)
Children	None	11 (38)
	One	8 (28)
	Two	4 (14)
	Three	4 (14)
	Four	1 (3)
Drug(s) of choice	Five	1 (3)
	Opiates (heroin, prescription pills)	20 (69)
	Crack/cocaine	15 (52)
	Alcohol	6 (21)
	No response	1 (3)
Length of addiction (years)	0-5	7 (26)
	6-10	6 (21)
	11-15	3 (10)
	16-20	5 (17)
	21-25	3 (10)
	26-30	3 (10)
	No response	1 (3)
Number of relapses	<5 times	18 (62)
	5-10	3 (10)
	10-15	3 (10)
	“A lot”	1 (3)
	No response	4 (14)
Currently report pain	No	13 (44)
	Yes	15 (52)
	Pain VAS 1-3	5 (17)
	Pain VAS 4-6	6 (20)
	Pain VAS 7-10	4 (14)
	No response	1 (3)

VAS=Visual Analog Scale, GED= General Education Development certificate/ United States High School Equivalency

Table 2: Quantitative results

Variable-results	Mean±SD
Yoga perceived benefit (scale 0-10)	6.85±2.82
Exercise perceived benefit (scale 0-10)	7.81±2.47
Mindfulness/meditation perceived benefit (scale 0-10)	8.36±2.34
SF-12 physical component subscale	49.26±8.32
SF-12 mental component subscale	38.87±11.47
Brief resilience scale	3.00±0.75
Toronto mindfulness scale decentering scale	19.6±4.45
Toronto mindfulness scale curiosity scale	16.9±4.16

SD=Standard deviation, SF=Short form

“Helping me stay positive and helps me have hope in my recovery”

“Why because it helps with my anxiety and pain”

“I will have a new outlet for negative energy.”

The women felt yoga is a multidimensional positive intervention with motivation, coping skills, and an enjoyable hobby (8/29).

“this will help me stay motivated, relaxed, and mindful”

“helps with my pain in a healthy way”

“teaches me coping skills”

Insightful responses included willingness to try activities (3/29), yet anticipated barriers for integration of yoga for continued recovery (2/29).

“it will depend if I have access to a yoga program. I have a low income”

“I do enjoy yoga very much so I plan on continuing to do it to stay busy/active”

Physical exercise impacts their ability to stay in recovery through positive physical impact, including strength, health benefits, and relaxation (15/29).

“helps with my pain in a healthy way”

“I work out everything and it gives me much more energy, helps with anxiety and pain”

“It allows the body to express physical capabilities and mindfulness.”

Exercise improves mental health, including reduced stress and anxiety, improves gaining control and inner strength (9/29). Motivation, self-esteem, pride, and determination also are enhanced (7/29).

“gives me confidence, determination and inner and outer strength”

“motivation and self-esteem taking pride and gaining control of who I am”

Regarding mindfulness, women reported impact on sustainable recovery, including decreased reactivity with

inner strength for relapse prevention (12/29). Spirituality and mindfulness is key in overall recovery (10/29).

“My emotions and my reactions to things are important. React negativity and I will get high.”

“When I’m mindful of myself is pretty much the only way I stay clean”

“staying mindful is a spiritual practice I believe spirituality is the key to recovery and life in general”

“because you have to be mindful of you and others to stay focused on our recovery”

Discussion

Quantitative data of our study participants approximates major demographics and are represented in national racial/ethnic categories.^[36] Overall, participants had lower averages in the SF-12 compared to normative values of 50 for both PCS and MCS sub-scores, indicating decreased physical function and potentially decreased QOL,^[22] despite the relatively young age of the participants. BRS scores showed averages on the lower end of the normal limits of resiliency.^[25,27] The curiosity and decentering sub-scales of the TMS were in the upper quartile range,^[28] indicating that a session of yoga improves these domains and indicates the possible response to yoga. Low scores on QOL and measures of resilience and mindfulness indicate the potential need and benefit for ongoing services, including comprehensively addressing pain and supportive efforts, for women in recovery. These measures are brief, valid, and reliable and can be easily incorporated in clinical practice or future research. In addition, our findings mirrored existing literature on the characteristics of women in recovery.^[19,37]

The women’s subjective responses indicate utility for multi-dimensional mind-body awareness and physical activity. Based on responses, a 60-min session of yogic stretching and breathing may produce physical and mental benefits along with the physical activity. This is comparable to other research incorporating yoga into mental and physical health well-being.^[18-20,37,38] Our participants ranked meditation higher than exercise or yoga in terms of their perception of sustainable recovery. Mindfulness-based addiction treatment, featuring yoga, shows specific benefit in preventing lapses from converting to full-blown relapse.^[39] It is theorized to be a feasible addition to MAT to more fully address underlying pain.^[40] One meta-analysis suggests that mindfulness-based interventions offer potentially helpful skills for persistent pain management, which has implications for women in recovery.^[41] If persistent pain complicates addiction, using multifaceted mind-body interventions, including yoga in overall sustainable recovery, will assist across the continuum of care.^[42]

Available evidence indicates women self-select yoga as a preferred method of physical activity during substance

use recovery.^[21] There are no significant differences found between exercise types (aerobics vs. mind-body exercise), nor among intensities for physical activity benefit while undergoing SUD treatment.^[43] Therefore, yoga of any type or intensity, may be considered a viable avenue to meet physical activity guidelines. When coupled with an Health Care Professional (HCP) referral or recommendation for yoga as a long-term form of physical activity, this may be beneficial in emotional, stress, and pain responses, with potential positive impacts on addiction, relapse, and sustainable recovery.^[18]

In light of the current opioid epidemic, prevalence of addiction, benefits of multi-modal pain management, and strong emerging body of evidence, including various community collaborators as team members is important.^[44] Despite issues with current health-care systems such as limited access to service, lack of trust, and exorbitant costs, HCP educational interventions for persistent diseases can alter individual health and behavior choices.^[45] However, the burden of chronic disease goes beyond health and health care systems.^[11] Health promotion strategies, such as low-or no-cost community-based yoga, may facilitate an accessible and affordable avenue for physical activity. This level of interprofessional practice requires knowledge and trust for collaboration with credible community resources local to the clinician.^[12] Therefore, community-based yoga could provide appropriate collaboration for the management of persistent pain in the context of SUD if the HCP is well versed and cultivates beneficial relationships with existing resources.

Limitations

Our descriptive study is with significant limitations. Unpredictability of voluntary participation in the yoga class, ongoing changes in admission to the inpatient SUD program, and optional participation in this study and the yoga class limited the sample size. Specifically, the intent was to capture first-time participation impressions and data, however based on voluntary and anonymous nature of the study, the women may have opted to attend the class before consenting to participate in the study. Based on these limitations and prior experiences of the unique participants, the data captured may not represent the participant's initial exposure to yoga. There may be a self-selection bias with women choosing to complete the study and survey measures based on their inherent choice of participation in yoga or prior experiences to admission to inpatient SUD rehab. Researchers were not granted permission to review inpatient rehabilitation records. Data collection was abbreviated and restricted due to time constraints, anonymity, and brief availability of the participants as dictated by the inpatient facility guidelines. A properly designed randomized controlled trial and qualitative study would provide richer analysis.

Conclusion

The SF-12, BRS, and TMS are brief, valid, and reliable and can be easily incorporated in clinical practice or future research. Suboptimal SF-12 scores were found in women with SUD and, therefore important to note in the context of recovery to optimize treatment. In addition, concerns regarding underlying pain and measures of resilience and mindfulness indicate the need to capture these data in SUD recovery. Subjective reports from the participants support previous literature that women undergoing SUD treatment find community-based yoga an enjoyable and beneficial type of physical activity in support of their personal recovery. Yoga may be a viable option for comprehensive mind-body intervention for this population.

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Ethical clearance

Ethical approval was obtained through the Stockton University Institutional Review Board (2019.072: Impact of Yoga on Mindfulness & Exercise: New Discoveries), with the John Brooks Recovery Center (Y4MEND/4.9.2019) and The Leadership Studio (Y4MEND/3.26.2019) approving and supporting this study.

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Conflicts of interest

There are no conflicts of interest.

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Appendix

Appendix A: STROBE checklist STROBE statement—Checklist of items that should be included in reports of cross-sectional studies

	Item number	Recommendation
Title and abstract Pg. 1 Pg. 2	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction Background/rationale Pg. 3-4	2	Explain the scientific background and rationale for the investigation being reported
Objectives Pg. 4 paragraph 3	3	State specific objectives, including any prespecified hypotheses
Methods Study design Pg. 4-7- procedures	4	Present key elements of study design early in the paper
Setting Pg. 4-5 Under participants	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants Pg. 4-5	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables Pg. 5-7 under procedures	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/measurement Pg. 5-7	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias Pg. 12 under limitations	9	Describe any efforts to address potential sources of bias
Study size Pg. 4-5 participants	10	Explain how the study size was arrived at
Pg. 7 Qualitative findings Quantitative variables Pg. 7 Qualitative results	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods Table 2 Pg. 7-9 Qualitative results	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results Participants Pg. 4-5 Participants	13*	(a) Report numbers of individuals at each stage of study - e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data Table 1 Pg. 7 Qualitative Findings	14*	(a) Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data Table 2 results Pg. 8-9 Qualitative results	15*	Report numbers of outcome events or summary measures
Main results Pg. 8-9 Qualitative Results Table 2 results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included

Contd...

Appendix A: Contd...

	Item number	Recommendation
		(b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done - e.g., analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarize key results with reference to study objectives
Pg. 9-12		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Pg. 12 limitations		
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Pg. 12-13 Conclusion		
Generalizability	21	Discuss the generalizability (external validity) of the study results
Pg. 13		
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
N/A		

*Give information separately for exposed and unexposed groups. An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.