The Association Between Social Relationship Quality and Subjective Cognition in Women Experiencing Homelessness and Precarious Housing

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Abstract

Research shows that People Experiencing Homelessness and Precarious Housing (PEHPH) have low-quality social relationships, which are linked to limited social networks, elevated emotional distress, and poorer subjective cognition. While women's experiences differ from men's, they remain understudied in this population. The present research examined whether associations between social relationship quality and social networks, emotional distress, and subjective cognition differ between women (n = 46) and men (n = 53) among PEHPH. The WHOQOL-BREF measured social relationship quality, the LSNS assessed social networks, the HADS measured emotional distress, and the PROMIS assessed subjective cognition. Linear regressions analyzed associations and gender differences, and simple slopes analyses probed interactions. The key finding is that higher-quality social relationships are associated with better subjective cognition among women. For both genders, higher-quality social relationships are linked to larger networks and less emotional distress. Among PEHPH, bolstering subjective cognition may enhance women's social relationship quality.

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Introduction

Homelessness is a serious global issue that was experienced by approximately 318 million people in 2023 (UN-Habitat, 2023). In Canada alone, an estimated minimum of 235,000 people experienced homelessness in 2016 (Gaetz et al., 2016), which grew to over 320,000 by 2022 (Employment and Social Development Canada, 2018, 2023). These statistics highlight both the high prevalence of homelessness and its alarming rate of growth within the Canadian context. In Canada, the definition of homelessness encompasses a spectrum of living situations, including unsheltered spaces such as streets, emergency shelters like those for people fleeing violence, provisional accommodations including transitional or institutional settings, as well as precarious housing, where conditions such as poverty place individuals at acute risk of homelessness (Gaetz et al., 2014). Individuals experiencing homelessness often transition between these various living contexts over time (Gaetz et al., 2012). To effectively support People Experiencing Homelessness or Precarious Housing (PEHPH) and address homelessness more broadly, it is essential to account for the diversity of circumstances and individuals within this population.

The Quality of Life of PEHPH

Governments and communities have historically prioritized understanding and addressing the immediate material needs of PEHPH, primarily focusing on essential resources such as food and emergency shelter. However, a growing body of literature highlights that this approach represents an overly narrow and reductive understanding of, and response to, the complex and multifaceted needs of PEHPH (Sangiuliano & Michel, 2024). To move beyond an understanding of PEHPH that centers mainly on immediate survival needs and toward one that emphasizes holistic, sustainable wellbeing, it is important to examine their Quality of Life (QoL). The Mental Health Division of the World Health Organization (WHO) defines QoL as an individual's

perception of their overall life at a given time, shaped by cultural, societal, and personal values, expectations, and priorities. QoL is a multifaceted construct comprising psychological, environmental, physical health, and social relationship domains, which are correlated with one another and with overall QoL (WHO, 2012). Research has found that QoL is lower among PEHPH than those living in stable housing (Flike & Aronowitz, 2022; Hubley et al., 2014). However, studies examining QoL among PEHPH have largely focused on overall QoL (Flike & Aronowitz, 2022; Hubley et al., 2014), leaving specific domains underexplored and limiting our understanding of them. To begin to address this gap in the literature, the present study specifically examined the quality of social relationships. Some of the important variables associated with lower social relationship quality include lacking social networks (e.g., Lam & Rosenheck, 2000; O'Connell et al., 2018), heightened emotional distress (Duke & Searby, 2019; Fazel et al., 2008; Hodgson et al., 2013; Schreiter et al., 2017) and worse subjective cognition, which refers to individuals' self-perceived cognitive abilities (Blumberg et al., 2024; Souza et al., 2020). While some of these dynamics have been explored in existing studies, further research is needed to account for the unique experiences of subgroups of PEHPH (Schwan et al., 2020).

Women's Experiences of Homelessness and Precarious Housing

An important shortcoming in the literature on the QoL of PEHPH is the underrepresentation of women participants in existing studies (Bretherton, 2017; Calsyn & Morse, 1990; Mayock et al., 2015). For example, a survey conducted by Employment and Social Development Canada (2023) found that approximately two-thirds of PEHPH in Canada identified as men, and one-third as women. While reports often show lower rates of homelessness among women compared to men, evidence indicates that women experience homelessness more frequently than these figures suggest (Bretherton, 2017; Calsyn & Morse,

1990; Mayock et al., 2015). This underrepresentation is considered to be largely due to the high prevalence of 'hidden homelessness' among women, who often avoid homelessness services (e.g., shelters, drop-in centres) due to safety concerns. Instead, women may stay in domestic violence shelters, hospitals, or the homes of friends or family (Mayock et al., 2015). As a result, many women in this population are not recruited into research, and their experiences – particularly how they differ from men's – remain understudied (Schwan et al., 2020).

Research that has examined women's experiences and gender differences among PEHPH has found that women in this population do indeed have unique experiences and vulnerabilities compared to men (Aldridge et al., 2018; Maurin et al., 1989; Rodriguez-Moreno et al., 2021; Winetrobe et al., 2017). For instance, significantly higher rates of mental health problems (Rodriguez-Moreno et al., 2021; Winetrobe et al., 2017) and psychological distress (Maurin et al., 1989) have been found among women in this population. This gender disparity has been attributed to the higher rates of violence and victimization experienced by homeless and precariously housed women, who report significantly more sexual assault and partner abuse than men (Rodriguez-Moreno et al., 2021). In addition, in the context of social isolation, many women experiencing homelessness have turned – or returned – to abusive partners for support, feeling defeated and like they have no better options, which further entrenches their isolation and weakens their positive social ties in a vicious cycle (Mayock et al., 2015). Such dynamics may help explain why social exclusion appears to have a more detrimental impact on the health of marginalized women, who face higher risks than both marginalized men and women in the general population across all International Classification of Diseases categories – particularly infectious diseases, mental health and behavioral disorders, cardiovascular conditions, respiratory conditions, injuries, and poisoning – and consistently exhibit a higher risk of death

(Aldridge et al., 2018). These findings underscore the need for a deeper understanding of the psychosocial experiences of women in this population and highlight the importance of recognizing these distinctive experiences in the broader literature on the QoL of PEHPH. To do this, we begin by reviewing the literature on the QoL social relationships domain, before investigating the interplay between social relationship quality and gender.

Social Relationship Quality

To understand the QoL social relationships domain among PEHPH, it is helpful to distinguish social relationship quality from social networks (Berkman & Glass, 2000; Holt-Lunstad et al., 2010). Social relationship quality refers to one's subjective evaluation of how satisfied they are with their interpersonal bonds (WHO, 2012) or the extent to which they perceive their relationships as positive or negative (Cohen & Wills, 1985). Social networks refer to the number and types of relationships people have (e.g., friend, family member, significant other; Berkman & Glass, 2000), as well as the frequency with which they engage with them. The distinction between these terms is critical because, in both the general population and among PEHPH, positive social relationships (i.e., higher-quality relationships; e.g., Gadermann et al., 2021; Lubben, 2018) have been linked to beneficial outcomes, whereas negative social relationships (i.e., lower-quality relationships; e.g., Lund et al., 2014; Mayock et al., 2015) and limited social networks (e.g., Holt-Lunstad et al., 2010; Palepu et al., 2012) have been associated with adverse consequences. For instance, in the general population, positive social relationships have been linked with benefits such as faster recovery from illness, more timely medical care, greater adherence to healthy behaviours, reduced stress, and enhanced immune system functioning. In contrast, negative social relationships have been associated with lower QoL, including elevated stress and increased risk of mortality (Friedman et al., 1995; Lund et al.,

2014; Tucker et al., 1996). Additionally, social disconnection has been associated with a 30% increased risk of heart disease, a 50% higher likelihood of early-onset dementia, and an elevated vulnerability to addiction, suicide, and obesity (Holt-Lunstad et al., 2010; Lubben, 2018). With respect to PEHPH, a systematic review by Flike and Aronowitz (2022) found that higher perceived social cohesion and stronger interpersonal relationships were associated with better QoL across North America, Europe, Australia, and Asia. In Australia, greater perceived social support was associated with better wellbeing (Johnstone et al., 2016). In Canada, higher perceived social support was linked to better overall QoL while lower perceived social support was linked to worse overall QoL (Gadermann et al., 2021). Further, in a qualitative study with PEHPH in four major Canadian cities, participants consistently emphasized the importance of social relationships to their overall QoL, as well as a profound sense of social strain and disconnection (Palepu et al., 2012). Their sentiments are poignantly illustrated through quotes about friendships: "There are no friends in the street… people you consume with are only there when you have dope" (Palepu et al., 2012, p. 7); about intimacy: "...you can think about love but it will take you nowhere…" (p. 8); and about feeling alone: "A lot of us are lonely" (p. 8). Taken together, research demonstrating the benefits of high-quality social relationships and the costs of low-quality relationships and limited social networks, along with evidence that PEHPH consistently report low-quality social relationships (Hawkins & Abrams, 2007; Watson et al., 2016), a lack of high-quality social connections, and small social networks (Palepu et al., 2012), underscores the importance of fostering more social relationships that are higher in quality among PEHPH.

To date, the unique experiences of women have been minimally addressed in research examining social relationship quality among PEHPH. Existing studies have generally found no

significant differences in this area between men and women (Gadermann et al., 2021; Konrady & Talarska, 2024; Zugazaga, 2008). However, the factors associated with social relationship quality, and how these may differ by gender within this population, remain largely unexplored. Nonetheless, select studies have investigated the associations between social relationship quality and variables such as social networks, emotional distress, and subjective cognition, including potential gender differences in these associations (e.g., Flike & Aronowitz, 2022; Konrady & Talarska, 2024; Souza et al., 2020; Zugazaga, 2008). This body of research informed the present study, which explores these three variables and their associations with social relationship quality through a gendered lens. Each of these factors is reviewed in turn.

Social Networks

Research examining gender differences in the size of social networks of PEHPH generally indicates that women tend to have larger social networks than men. This pattern has been observed, for example, among people moving into supportive housing in Los Angeles, (Winetrobe et al., 2017), as well as among those experiencing homelessness in Alabama (LaGory & Sells, 1997) and Missouri (Calsyn & Morse, 1990). However, a study conducted in Florida found no significant difference in the number of social contacts between men and women living in emergency shelters (Zugazaga, 2008). In sum, while most research suggests that women in this population have larger social networks than men (Calsyn & Morse, 1990; LaGory & Sells, 1997; Winetrobe et al., 2017), the discrepant findings of recent studies (Winetrobe et al., 2017; Zugazaga, 2008) suggest that gender differences in social network size may be less definitive than previously thought.

The association between better overall QoL and larger social networks among PEHPH has been observed in research (e.g., Flike & Aronowitz, 2022). For example, among United

States veterans experiencing homelessness, rent subsidies were most strongly associated with higher overall QoL for those with larger social networks, suggesting that social networks – above and beyond housing support – play a key role in QoL (O'Connell et al., 2018). Similarly, a longitudinal study with PEHPH in the United States found that larger social networks were associated with higher overall QoL both at baseline and at a 12-month follow-up, and increases in network size were linked to improvements in overall QoL over time (Lam & Rosenheck, 2000). Although these investigations did not directly assess the association between social relationship quality and social network size, they did find links between better overall QoL and larger social networks (Lam & Rosenheck, 2000; O'Connell et al., 2018). Given that social relationship quality is a component of overall QoL (WHO, 2012), these findings may suggest a connection between social relationship quality and social network size. In contrast to these findings, in Poland Konrady and Talarska (2024) conducted the only study, prior to the present one, that directly examined the link between social relationship quality and social network size among PEHPH and they found no association. However, Konrady and Talarska (2024) measured social network size using a survey they developed themselves (Konrady & Talarska, 2024), whereas the studies that found links between social network size and overall QoL used validated measures (O'Connell et al., 2018; Lam and Rosenheck, 2000), therefore the divergence in findings may reflect methodological differences. Additionally, the differential results may reflect cultural factors (e.g., societal values as well as social systems and structures) since Konrady and Talarska (2024) conducted their study in Poland and the other research was conducted in the United States. Ultimately, the scarcity of research in this area, and the discrepant findings in the studies that have been completed, leave our understanding of the association between social relationship quality and social network size unclear.

Emotional Distress

Mental health problems both increase vulnerability to homelessness and emerge in response to it (Duke & Searby, 2019), therefore their high prevalence among PEHPH is unsurprising. Mental illness affects approximately two-thirds of this population (Barry et al., 2024; Employment and Social Development Canada, 2023), compared to 14.6% of the general population (WHO, 2022). A systematic review and meta-analysis (Ayano et al., 2021), along with an umbrella review of systematic reviews and meta-analyses (Hossain et al., 2020), examined mental illness among people experiencing homelessness in high-income countries. Depression and anxiety emerged as two of the most prevalent mental health challenges. Reported rates of depression among PEHPH range from 11.4% (Fazel et al., 2008) to 57.9% (Duke & Searby, 2019), while rates of anxiety range from 17.6% (Schreiter et al., 2017) to 32% (Hodgson et al., 2013). These figures stand in contrast to general population rates of approximately 5% for depression and 4.8% for anxiety (WHO, 2022).

Gender differences in emotional distress have been well established. Globally, depressive disorders are more common among women than men in the general population (6.0% versus 4.0%), as are anxiety disorders (5.9% versus 3.6%; WHO, 2022). Consistent with the general population, reported rates of mental health conditions are higher in women than men among PEHPH (Milaney et al., 2020; Montgomery et al., 2017). For instance, a systematic review and meta-analysis of mental disorders among PEHPH found that diagnosed anxiety disorders were more than twice as prevalent among women than men (30.9% vs. 14.1%; Schreiter et al., 2017). Similarly, in the United Kingdom, Rea (2023) found that women reported higher rates of depression and anxiety symptoms compared to men.

The association between social relationship quality and emotional distress has been explored among PEHPH and related populations. For instance, an association between better social relationship quality and less depressed mood was observed among PEHPH in Poland by Konrady and Talarska (2024), and in a population of individuals with substance use disorders in Norway (Muller et al., 2019). Likewise, among adults experiencing homelessness in the United Kingdom, Rea (2023) found that those with higher perceived social support had less psychological distress, as indicated by lower levels of anxiety and depression. However, further analysis of their data showed that these associations depended on both the source and type of support. Specifically, lower levels of depression and anxiety were linked to higher perceived emotional support (e.g., listening, empathizing, reassuring) from housed friends and family, as well as to higher perceived instrumental support (practical, tangible help) from housed friends. In contrast, no such associations were found with instrumental support from family or with any type of perceived support from others experiencing homelessness. Rea (2023) also examined whether the association between perceived social support and psychological distress differed between men and women, finding that it did not. Together, the findings discussed provide evidence of a link between higher-quality social relationships and reduced emotional distress among PEHPH, as well as preliminary support indicating that this association varies based on the source and kind of support and does not differ between men and women.

Subjective Cognition

To contextualize our inclusion of subjective cognition in the present study, we begin by briefly discussing objective cognition, which refers to performance-based functioning in domains such as memory, attention, processing speed, and problem-solving, and is measured using standardized tests (Lezak, 2012). Clinically significant impairment in objective cognition is

highly prevalent among PEHPH, affecting approximately three-quarters of adults (Gicas et al., 2014, 2017; Stergiopoulos et al., 2015). In contrast, subjective cognition, which refers to individuals' perceptions of their own cognitive abilities and is typically assessed via self-report, has received less attention. Although no link has been found between objective cognition and QoL among PEHPH (Blumberg et al., 2024; Gicas et al., 2023), subjective cognition may have meaningful ties to QoL, including social relationship quality, in this population (e.g., Blumberg et al., 2024; Caqueo-Urízar et al., 2015; Souza et al., 2020).

Prior to the current study, no research had examined gender differences in subjective cognition among PEHPH. However, a few studies have explored this in other populations. For instance, Giannouli et al. (2023) found that in the general population of Greece, among older adults with an average age of 72 years, women rated their subjective cognitive functioning more highly than men did. Conversely, among younger adults with an average age of 28 years, the pattern reversed, such that men rated their subjective cognitive functioning higher than women did. Similarly, Iv et al., (2022), in a sample of Chinese patients with a mean age of 26 years who were experiencing subthreshold depression, found that women rated their subjective cognitive functioning lower than men did. Overall, results suggest that younger men and older women rate their subjective cognition more highly than younger women and older men, respectively.

With respect to the association between subjective cognition and social relationship quality, a separate study conducted as part of the present program of research found an association between stronger subjective cognition and higher social relationship quality among PEHPH in Canada (Blumberg et al., 2024). Additionally, in research conducted by Souza et al. (2020), participants aged 50 and older living in supportive housing in the United States who rated their subjective cognition more highly reported better global mental health – a construct

encompassing QoL, emotional distress, and social health. This result may suggest that subjective cognition is linked with the QoL and social health components of global mental health, and thus with social relationship quality. However, the third component of global mental health, emotional distress, is known to be associated with subjective cognition (Scholtissen et al., 2011; Shin et al., 2016), and since the three components are combined into one score, it is not possible to determine if and how each one is individually associated with subjective cognition.

Additional associations between QoL and subjective cognition have been identified outside the PEHPH population, including among psychiatric groups – an especially relevant consideration given the high prevalence of mental illness within PEHPH (Barry et al., 2024). For example, outpatients with schizophrenia in Korea who perceived themselves as more cognitively capable reported higher QoL (Shin et al., 2016). Similarly, among individuals with schizophrenia attending public mental health clinics in Bolivia, Chile, and Peru, Caqueo-Urízar et al. (2015) found that those who reported higher overall QoL also reported greater subjective social cognition, which encompasses perceiving, interpreting, processing, and responding to social cues. These findings suggest that individuals' perceptions of their socially relevant cognitive abilities in particular may be linked to their overall QoL.

Links between subjective cognition and social relationship quality have also been observed in the general population. For instance, in a probability sample of adults, on days when participants reported better cognitive functioning, they engaged in social interactions more frequently and enjoyed them more (Kang et al., 2017). In the United States, associations between worse subjective cognition and negative interactions with others have been found, which did not differ between men and women (Mueller et al., 2023). Most broadly, a systematic review of research examining associations between subjective cognition and QoL found that greater

subjective cognitive impairment was associated with lower QoL (Hill et al., 2017) and worse social functioning (Scholtissen et al., 2011). Overall, the findings discussed demonstrate links between better subjective cognition and higher QoL, and preliminary evidence that better subjective cognition is associated with higher social relationship quality, among PEHPH. However, more research is needed to assess how these associations may vary by gender among PEHPH.

The Present Study

The current study aimed to build on the literature discussed by examining associations between the quality of social relationships and social network size, distressed mood, and subjective cognition among PEHPH. Furthermore, we sought to provide novel insight about if and how these associations differ between those who identify as women and men within this population. We hypothesized that larger social networks, less distressed mood, and better subjective cognitive functioning would be associated with better social relationship quality. Our investigation of gender differences was exploratory given the lack of prior research examining how these associations differ between men and women among PEHPH.

Methods

Participants

Between September 2022 and July 2023, participants were recruited in Toronto, Ontario through (1) a list of individuals who took part in the *Ku-gaa-gii pimitizi-win* community-based cohort study (Richard et al., 2022) and agreed to be contacted for subsequent research; (2) a local drop-in center serving men aged 50 and older; (3) a women's residence; (4) a temporary COVID-19 shelter; (5) and snowball sampling wherein participants recruit others through their social networks or other connections. Research assistants screened candidates to assess whether they

were eligible to participate in the study. To be enrolled, individuals had to be 18 years or older, fluent in English, able to see and hear testing stimuli, never diagnosed with or suspected of having dementia, and have experienced homelessness or precarious housing at least twice in the past year, each time for a minimum of seven consecutive nights. Of the 106 individuals who consented to participate in the study, two were excluded due to missing data and five due to weak validity ratings (as determined by the evaluation process outlined below). Consequently, 99 adults were included in the final sample and analyses.

Procedures

Research and ethics approval were obtained from the York University Human Participants Review Committee (REB Certificate #: STU 2024-077). Participants were tested in person by a research assistant at a private location, either at York University, a Toronto public library, or the shelter from which they were recruited. After providing informed consent, participants accessed the online survey platform REDCap (Harris et al., 2009) on an iPad, where they answered questionnaires about their demographics, social relationship quality, social network size, psychological distress, and subjective cognition. Subsequently, under the supervision of a clinical psychologist, research assistants conducted brief assessments of major mental disorders. These and other data were collected as part of a larger research program examining cognition and functional outcomes among PEHPH. Following each testing session, participants were provided $50.00 as compensation for their involvement in the study, then research assistants assigned a subjective validity rating to each measure completed using a 5-point Likert scale. We included data from participants with measures rated "*5 = Clearly Valid*" or "*4 = Likely Valid*"; we excluded data from five participants with measures rated "*3 = Questionably Valid*,", *"2 = Likely Invalid*", or *"1 = Clearly Invalid"*. Low validity ratings were

primarily attributed to participants' impairments in comprehension and attention due to mental health symptoms and/or limited literacy.

Measures

Sample Characteristics

Participants' demographics were collected through a self-report questionnaire. Demographics reported in the present study include gender identity, age, ethnicity, years of formal education, and housing status. To indicate their gender identity, participants selected one response from the options male; female; intersex; trans – female to male; trans – male to female; prefer not to answer; do not know; and other.

Mental Health Disorders

Trained research assistants, supervised by a registered psychologist, administered the Mini-International Neuropsychiatric Interview (M.I.N.I.; Sheehan et al., 1998) to assess participants for major psychiatric disorders included in the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5; American Psychiatric Association, 2013), and the International Classification of Diseases Tenth Revision (WHO, 2004). These brief structured interviews were conducted to determine whether participants met criteria for current major depressive disorder, generalized anxiety disorder, psychotic and bipolar disorders, antisocial personality disorder, post-traumatic stress disorder, obsessive-compulsive disorder, social anxiety disorder, panic disorder, agoraphobia, and alcohol or other substance use disorders. The M.I.N.I. has been shown to be a reliable and valid psychometric tool (First et al., 2015).

Social Relationship Quality

Social relationship quality was measured using the social relationships domain of the WHO QoL Brief Version (WHOQOL-BREF) self-report questionnaire, which is a short form of

the WHO QoL 100 Item Version (WHOQOL-100; WHO, 2012). Its social relationships domain consists of three items that measure how satisfied individuals have been with their personal relationships, support from friends, and sex life over the past two weeks. Participants respond to questions including *"How satisfied are you with your personal relationships?"* by selecting one response from five options on a Likert scale, ranging from *"1 = Very Dissatisfied" to "5 = Very Satisfied"*. The WHOQOL-BREF social relationship domain scores were calculated by summing the items, dividing that sum by three to get their mean, then multiplying that number by four, so scores could range from 4-20. Those scores were then transformed to be comparable with scores from the WHOQOL-100 using the formula (Social Relationship domain score – 4) x (100/16) (WHO, 2012). Transformed scores could range from 0 to 100, with higher scores representing greater satisfaction with social relationships. For the sample in the present study, Cronbach's alpha was found to be acceptable for the WHOQOL-BREF ($\alpha = 0.73$). The measure is one of the few QoL psychometric instruments that has been well-validated in PEHPH (Flike & Aronowitz, 2022), and according to Gordon et al. (2019) it is the QoL measure that has the most support for use with PEHPH.

Social Network Size

The Lubben Social Network Scale 6-item (LSNS-6; Lubben & Gironda, 2000) measured participants' quantity of social support. In responding to this instrument, participants self-report the number of friends and family members with whom they are connected. Items include questions such as *"How many friends do you feel close to such that you could call on them for help?"*. Participants selected one response from six options on a Likert-type scale ranging from *"0 = None" to "5 = Nine or More"*. Finally, the items are summed and LSNS scores can range from 0-30, with higher scores indicating more social relationships. Cronbach's alpha was good

for the LSNS (α = 0.85) in the present study, consistent with evidence that suggests the LSNS has good internal consistency, as well as high person and item reliability (Gray et al., 2016; Merchant et al., 2020).

Emotional Distress

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) assessed respondents' levels of anxiety and depression. Participants were presented with 14 items, such as "*I feel tense or 'wound up"*, and were instructed to select one response from four options on a Likert-type scale ranging from zero to three, with *"0 = Not at All" to "3 = Most of the Time"*. In the present study, the HADS anxiety and depression scores were summed into a single measure of emotional distress. This approach is endorsed by Norton et al. (2013) based on the results of a factor analysis, and it produced a range of possible scores from 0-42, with higher scores depicting more emotional distress. In the present study, Cronbach's alpha was found to be good for the HADS ($\alpha = 0.85$). The instrument has been used widely and has shown good internal reliability and discriminant validity (Bjelland et al., 2002; Stern, 2014).

Subjective Cognition

The Patient Reported Outcomes Measurement Information System (PROMIS) Cognitive Function Short Form 8-item (Iverson at al., 2021) examines individuals' subjective evaluation of their cognitive capacities. Participants responded to statements such as *"My thinking has been slow"* by selecting one of five response options on a Likert scale ranging from *"1 = Very Often (Several Times a Day)" to "5 = Never".* The range of possible scores on the PROMIS Cognitive Function Short Form 8-item was 8-40, with higher scores indicative of better subjective cognition. In the present study, Cronbach's alpha was found to be excellent for the PROMIS (α =0.93); the measure has shown good internal consistency and construct validity (Henneghan et

al., 2023; Iverson et al., 2021).

Statistical Analyses

All statistical analyses were conducted in R Studio (R Core Team, 2020). Cronbach's alphas were computed for each psychometric measure to examine their reliability. Welch's independent t-tests were computed to assess differences in demographics between the group of men versus the group of women in age and years of formal education. Differences between the genders in social relationship satisfaction, social network size, emotional distress, and subjective cognition were also assessed using Welch's independent t-tests. Prior to conducting Welch's independent t-tests assumptions were examined. Homogeneity of variances was examined using Levene's tests and normality was assessed for each measure in each group through visual inspection of histograms and numeric descriptive statistics and Shapiro Wilk tests. Pearson correlation coefficients were generated between social relationship quality, social network size, emotional distress, and subjective cognition, for the group of men and the group of women separately, so that bivariate association could be examined within and between the groups. Before Pearson correlation coefficients were computed scatterplots were visually examined for linearity and outliers.

A series of hierarchical multiple linear regressions was conducted with social relationship quality as the dependent variable, social network size, emotional distress, and subjective cognition as independent variables, and gender as a moderator. The group of women, comprised of those who selected the female category, were the reference group, which was coded as zero. The group of men, comprised of participants who selected the male category, was the comparison group, which was coded as one. No other gender categories were endorsed by the participants. In step one, main effects were tested, with independent variables entered into the

model one at a time in a stepwise method, beginning with social network size, followed by emotional distress, then subjective cognition. Independent variables were retained in the model if they explained a significant amount of variability in social relationship quality, significantly increased the amount of variability accounted for by the model, or the results of the Pearson correlation analyses led us to believe that, once moderated by gender, they may significantly increase the amount of variability accounted for by the model. In step two, interaction terms were tested, again in a stepwise manner, with gender entered as a moderator of the association between social relationship quality and each independent variable one at a time; interaction terms were retained if found to be statistically significant at $p < .05$. In terms of assumptions, linearity and homoscedasticity were examined by visually inspecting a fitted versus residual plot, independence of observations was assessed using a Derbin Watson test, and normality was checked through visual examination of a qqplot and via a Shapiro Wilk test. Additional diagnostics verified include influential/extreme cases, with univariate outliers assessed using Cook's Distance and multivariate outliers assessed using Mahalanobis distance, and multicollinearity was examined using Variance Inflation Factor. Finally, a simple slopes analysis was conducted to examine associations within each gender group for statistically significant interaction terms.

Results

Descriptive Statistics and t-tests

All assumptions and diagnostics assessed were determined to be sufficiently satisfied. Table 1 presents participants' characteristics by gender. With respect to demographics, 46 individuals identified as women and 53 identified as men; no participants selected other gender categories. The mean age of the women *(M* = 39.76 years, *SD* = 12.35*)* was significantly lower

than that of the men (46.92 years, *SD* = 16.10), *t*(95.63) = 2.51, *p* = .014, 95% CI [1.48, 12.85], but the mean number of years of formal education obtained by the women (*M* = 13.22 years, *SD* = 3.26) did not differ from that obtained by the men (*M* = 12.73 years, *SD*), *t*(96.94) = -0.69, *p* = .494, 95% CI [-1.91, 0.93]. Visual inspection of the distribution of participants' racial and ethnic identities and current mental health disorders showed differences between groups. More women identified as Black African, Black Caribbean, and/or White European, while more men identified as White North American, South Asian, and/or another ethnicity. With respect to current mental health disorders, compared to men, women endorsed considerably lower rates of most disorders. For instance, fewer women endorsed substance use disorders, including alcohol use disorders, as well as antisocial personality disorders, psychotic disorders, and post-traumatic stress disorders, although more women endorsed panic disorders. In terms of residency, the largest discrepancy was that more women lived in an emergency shelter and more men lived in transitional housing.

Table 1 also shows descriptive statistics for social relationship quality, social network size, emotional distress, and subjective cognition for the men and women. As reflected by the relatively large standard deviations and ranges, there was considerable variability in the observed scores. However, no differences were found between the groups on any of the variables, including social relationship quality, *t*(96.07) = -1.34, *p* = .184, 95% CI [-16.38, 3.18], social network size, *t*(96.15) = -0.37, *p* = .714, 95% CI [-2.97, 2.04], emotional distress, *t*(96.43) = -0.00, *p* = .998, 95% CI [-2.95, 2.94]) and subjective cognition, *t*(88.75) = -1.42, *p* = .159, 95% CI [-5.61, 30.11].

Pearson Correlation Coefficients

Table 2 shows Pearson correlation coefficients between social relationship quality and

social network size, emotional distress, and subjective cognition, for men and women. Better social relationship quality was significantly and moderately associated with larger social networks for both women and men. The association between better social relationship quality and more emotional distress was significant and moderate-to-strong for women and was significant and moderate for men. Finally, the association between better social relationship quality and better subjective cognition was significant and moderate for women, and for men the association was non-significant.

Linear Regressions and Simple Slopes

Table 3 shows the best-fitting model identified through the series of hierarchical multiple linear regressions. Altogether, the model accounts for approximately 41.96% of the variance in social relationship quality, $R^2 = .77$, $F(5, 93) = 13.45$, $p < .001$. As hypothesized, better social relationship quality was significantly associated with larger social networks and with less emotional distress. Gender did not significantly moderate the associations between social relationship quality and social network size or emotional distress. While subjective cognition was not significantly associated with overall social relationship quality, there was a significant interaction in which the association between subjective cognition and social relationship quality was moderated by gender. Results of the simple slopes analyses indicated that better subjective cognition was significantly associated with better social relationship quality for women, $b = 0.75$, $SE = 0.37$, $t(93) = 2.01$, $p = .047$, 95% CI [0.01, 1.49], but not for men, $b = -0.29$, $SE = 0.39$, $t(93) = -0.73$, $p = .468$, 95% CI [-1.07, 0.49]. Figure 1 shows the interaction between social relationship quality and subjective cognition and the simple slopes for women and men.

Discussion

The present study examined whether the quality of social relationships is associated with

social network size, emotional distress, and subjective cognition among PEHPH, with a focus on whether these associations differ between individuals who identified as women versus those who identified as men. Before examining the associations among the variables, we assessed whether scores on each variable differed between men and women to provide descriptive context and clarify baseline differences. Our key novel finding was that higher-quality social relationships were associated with better subjective cognitive functioning among women, but not men. We discuss all results in relation to our hypotheses and the existing literature.

Findings in Context

Consistent with prior research (Gadermann et al., 2021; Konrady & Talarska, 2024; Zugazaga, 2008), the examination of gender differences in social relationship quality found no variation between men and women in the present study. Likewise, the social network size of women and men did not differ in the current study, consistent with research with PEHPH by Zugazaga (2008). However, this contrasts with studies that found that women had larger social networks than men among PEHPH (Calsyn & Morse, 1990; LaGory & Sells, 1997; Winetrobe et al., 2017). The findings that men and women have comparable networks sizes appear to update our understanding of current social patterns, as most studies showing gender differences in social network size were conducted around 30 years ago, and shifts over time may have led to more balanced networks among men and women in this population. Additionally, studies examining gender differences in the social networks of PEHPH took place in distinct geographic regions, including St. Louis (Calsyn & Morse, 1990), Birmingham (LaGory et al., 1997), Los Angeles (Winetrobe et al., 2017), and Florida (Zugazaga, 2008). These areas differ in service infrastructure, population demographics, and housing contexts, which may shape the experiences of PEHPH and influence findings related to gender and social networks.

In examining the association between social relationship quality and network size, we found that individuals with larger social networks reported higher-quality relationships in the present study, as hypothesized. This association did not differ between men and women. The link between larger social networks and higher-quality social relationships found in the present study aligns with previous research conducted in the United States, which has shown that larger social networks are associated with a higher overall quality of life among PEHPH (Lam & Rosenheck, 2000; O'Connell et al., 2018). However, it contrasts with the finding of Konrady and Talarska (2024), who observed no direct association between social network size and the quality of social relationships among PEHPH in Poland. As mentioned, the discrepancy between the findings of Konrady and Talarska (2024) and those of other studies may stem from methodological differences, since Konrady and Talarska (2024) used a self-developed survey to assess social networks, whereas the other studies relied on established questionnaires. Cultural context may also have influenced the results, as the Konrady and Talarska (2024) study was conducted in Poland, and the others took place in the United States. While the reasons for this discrepancy remain undetermined, our finding adds to the growing body of evidence indicating that larger social networks are associated with higher-quality social relationships among PEHPH.

In the current study, levels of emotional distress – specifically anxiety and depression – did not differ between women and men. The lack of a gender difference contrasts with past research with PEHPH, which has found higher levels of anxiety and depressive symptoms (Rea, 2023) and higher rates of depressive disorders (Schreiter et al., 2017) among women. One possible explanation for this discrepancy may relate to results from a study with PEHPH aged 50 and older, of whom three-quarters were men, which found that continued homelessness was associated with greater depressive symptoms (Dobbins et al., 2024). As noted, in the present

study the mean age of men was higher than that of women, with many recruited from a drop-in centre serving only men aged 50 and older, so they may have experienced homelessness for longer periods, potentially contributing to elevated levels of emotional distress among these older men, making them similar to the levels of the younger women.

As hypothesized, higher emotional distress was associated with lower-quality social relationships in the present study, with no gender differences evident. This finding aligns with previous research conducted with PEHPH in Poland, showing that depressed mood was linked to lower-quality social relationships (Konrady & Talarska, 2024), and a similar pattern found among individuals with substance use disorders in Norway (Muller et al., 2019). Notably, the Norwegian study also found no gender differences in this association, echoing our results. Similarly, Rea (2023) reported that individuals experiencing homelessness in the United Kingdom who experienced less emotional distress – specifically less anxiety and depression – perceived greater emotional support from housed friends and family, as well as more instrumental support from housed friends. This association also did not differ by gender, consistent with our findings. However, a more detailed analysis in Rea's (2023) study revealed that emotional distress was not associated with instrumental support from family members, nor with any type of support from others experiencing homelessness. This contrasts with the present study's broader link between higher-quality social relationships and lower emotional distress, underscoring the complexity of this relationship.

The finding of Rea (2023) may offer insight into the results of a study by Bower et al. (2023), which found that PEHPH in Australia who rated their current relationships as more important, supportive, and satisfying, reported greater loneliness. The authors interpreted these seemingly paradoxical findings in light of their 2018 study showing that PEHPH tended to

prioritize relationships that met their practical needs over those offering emotional closeness. In other words, they suggested that participants valued relationships that helped them navigate the challenges of daily life (e.g., accessing resources, maintaining safety), viewing them as important, supportive, and satisfying, even though these connections also left them feeling interpersonally disconnected (Bower et al., 2023). Together, these results suggest that better social relationship quality is associated with reduced depression and anxiety overall, yet these associations may vary depending on the source and kind of social relationship. This highlights the nuanced links between social ties and emotional well-being among PEHPH, emphasizing the importance of considering both the functional and emotional dimensions of support.

Subjective cognition did not differ between women and men in the current study. This finding diverges from previous research showing that, among young adults, women rated their subjective cognitive functioning lower than men did, both in a sample from the general population with a mean age of 28 years (Giannouli et al., 2023), and a sample of inpatients being treated for schizophrenia with a mean age of 26 years (Iv et al., 2022). Our finding also contrasts with prior results showing that, among older adults from the general population with a mean age of 72 years, men rated their subjective cognitive functioning lower than women did (Giannouli et al., 2023). In sum, these studies suggest that subjective cognition tends to be rated more highly by younger adult men and older adult women. Therefore, in the present study, the absence of a gender difference in subjective cognitive functioning may be due to the fact that our participants were middle aged, and the men's mean age of 47 years is older than the women's mean age of 40 years, which may have mitigated gender-based differences.

Subjective cognition was not significantly associated with social relationship quality in the total sample of the present study, contrary to our hypothesis. This finding was unexpected, as

it differs from those of previous research with PEHPH (Blumberg et al., 2024; Souza et al., 2020), patients with schizophrenia (Caqueo-Urízar et al., 2015; Shin et al., 2016), and the general population (Kang et al., 2017; Scholtissen et al., 2011). Moreover, when examining this association by gender, we found that women who perceived themselves as more cognitively capable reported higher-quality social relationships, whereas this pattern was not observed among men. This finding highlights subjective cognition as a unique factor associated with QoL among PEHPH who identify as women. While the reasons for this gender discrepancy are unclear, we draw on studies of intimate partner abuse, and internalized stigma, to propose possible reasons for this divergence.

Experiencing intimate partner violence has been shown to negatively impact how women view their intelligence (Enander, 2010). In a study by Enander (2010), women survivors often described themselves as "stupid" for being manipulated, staying in the relationship, or not leaving sooner. Perpetrators frequently insulted survivors' intelligence, and women internalized these messages, leading to lower self-esteem and reinforced shame. Many also reported feeling judged by others as "stupid" for not leaving, further compounding these effects. Together, these experiences led women to feel less intelligent and less valued, which may contribute to their perception of lower-quality relationships. Combined with the much higher prevalence of violence against women compared to men, particularly among PEHPH (Rodriguez-Moreno et al., 2021), this may help explain why the link between lower subjective cognition and poorer social relationship quality was observed only among women in the present study. While intimate partner violence was not assessed in the present study, its role should be examined in future research exploring the quality of social relationships among women experiencing homelessness and precarious housing, given its potential significance for this population and their experiences.

Another explanation for this association may lie in research showing that more internalized stigma links greater self-perceived cognitive deficits with lower QoL among individuals with schizophrenia (Shin et al., 2016). Traditional norms frame men as "breadwinners" who are responsible for financially supporting their family (Lee, 2022). In a study by Lamarche et al. (2021), when men's masculine identity was threatened, they withdrew from intimacy and interdependence. Therefore, it may be that men who experience homelessness withdraw from social connection, which severs their confrontation with any stigma associated with their inability to provide for others. This detachment from interconnection in times of threat has not been observed in women, who are traditionally cast as caregivers and homemakers (Birns et al., 1994). Therefore, women experiencing homelessness – including those struggling to care for children – continue to feel relational responsibilities and may be more likely to view themselves as inadequate, resulting in heightened self-blame and stigma (Mayock et al., 2015). Additionally, due to elevated safety risks, many women avoid shelters and public facilities, rendering their homelessness more "hidden" and perhaps more acute (Rodriguez-Moreno et al., 2021). This invisibility, combined with greater vulnerability, may lead to more intense stigma than that experienced by men, whose homelessness is more visible and socially normalized (Andermann et al., 2021; Mayock et al., 2015). Taken together, this evidence suggests that among PEHPH, women may judge themselves, and their cognitive capacities, more critically than men do, contributing to heightened internalized stigma and perceptions of lower-quality relationships. While we have offered some possible explanations for our findings, further research is needed to clarify the reasons behind this association.

Strengths, Limitations and Future Directions

The present study offers valuable insights into the quality of social relationships among

PEHPH. A notable strength of this research is its nearly equal representation of participants who identified as women and men. The balanced distribution allowed for the examination of gender differences within this population, which is a meaningful contribution given the historical underrepresentation of women in studies involving PEHPH. Furthermore, as one of few examinations of subjective cognition among PEHPH, the present study offers novel insight into gender differences in the association between social relationship quality and subjective cognition in this population.

As reported, a link between better subjective cognition and higher-quality social relationships was observed among women but not men. Future research should aim to replicate this finding and explore it's correlates and implications. Further insight into this link may be gained by building on the work of Shin et al. (2016), who found that stigma helped explain the connection between subjective cognition and the quality of social relationships. Future research could examine whether stigma plays a similar role in this connection among PEHPH populations, and how these links may differ between men and women. It may also be important to consider how these associations may differ between women with and without children, as those who see themselves as unable to support their kin may internalize even greater stigma.

Building on findings that intimate partner violence undermined women's belief in their cognitive capacities (Enander, 2010), further insight may be gained by examining whether, among PEHPH, women's experiences of abuse contribute to doubts about their intelligence, and in turn, influence how they evaluate the quality of their social relationships. This connection may represent an extension of the findings by Caqueo-Urízar et al. (2015), who reported that higher overall quality of life was associated with greater subjective social cognition. From this perspective, women who see themselves as poor at judging and navigating their intimate

relationships may come to view their broader social relationships as lower in quality. Moreover, while evidence shows that intimate partner violence is linked to compromised social relationships among women (Mayock et al., 2015), research has also found that men who have experienced sexual violence report less social support than men who have not (Zugazaga, 2008). Therefore, it would be valuable to investigate whether the association between social relationship quality and subjective cognition differs between women and men who have experienced domestic and/or sexual violence, in order to better understand the distinct roles that gender and abuse may play in shaping these connections. Finally, given that different types and sources of social relationships have been found to be differentially associated with emotional distress (Rea, 2023), future studies should explore whether specific types and sources of social relationships are uniquely associated with subjective cognition, and how this may vary by gender. Such investigations could help clarify the nuances of these associations and deepen our understanding of QoL among PEHPH populations, particularly women.

An important limitation of the present study is that, despite a range of gender identity options to select from, participants reported only binary identities (i.e., men and women). This is a noteworthy consideration that points to potential barriers in reaching and recruiting this vulnerable and likely multiply marginalized subgroup, which is particularly relevant given prior research indicating that gender-nonconforming individuals in the general population are at a heightened risk of social rejection and lacking supportive social relationships (Schwan et al., 2020; Teixeira et al., 2023). Similarly, only three men and no women identified as Indigenous in the presents study. This is an important limitation given that Indigenous people represent roughly one-third of the population of PEHPH in Canada (Gaetz et al., 2016), and Indigenous women, in particular, experience alarmingly high rates of domestic abuse. Additionally, this study excluded

individuals who were not fluent in English; such restriction could have mitigated examination of how language barriers and related factors such as acculturation may affect social networks and relationship quality. Together, these limitations restrict the generalizability of the findings to gender-nonconforming individuals, Indigenous groups, and those not fluent in English. Future work should aim to address this gap by examining the associations assessed in the present study among PEHPH who belong to these groups.

Given the high rates of homelessness in Toronto, where our study was conducted, and across Canada, it is valuable that our findings contribute to a deeper understanding of social factors among PEHPH in this city and Country. However, our findings may not be generalizable to rural communities or populations outside of Canada. Research in other geographic locations can expand our understanding of gender differences in variables associated with the quality of social relationships among PEHPH.

Another strength of the present study is our use of the WHOQOL-BREF, a psychometrically robust measure that has been well-validated for use with individuals experiencing homelessness or precarious housing. However, as the WHOQOL-BREF is a shortened version of the WHOQOL-100, it may not fully capture the complexity of social relationship quality. Future research could benefit from employing the full-length scale to allow for a more comprehensive assessment of the social relationships domain of QoL. Additionally, the present study design was cross-sectional, which prevents causal inferences between social relationships quality, subjective cognition, social network size, and emotional distress. Future research should consider longitudinal designs to examine the temporal associations between these variables among PEHPH.

Finally, participants' duration of homelessness and their pathways into homelessness

were not assessed, though these factors are plausibly linked to differences in social experiences. These important considerations could be meaningfully explored in future work. This kind of variability – shaped by individual histories and identities – is also reflected in the broad range of scores and high standard deviations observed across study variables. Such variability underscores the heterogeneity that is typical of PEHPH populations, which include individuals with diverse gender, racial, ethnic, and cultural identities (Nilsson et al., 2019; Peressini, 2007; Warburton et al., 2022). This diversity adds complexity to interpreting findings and should be carefully considered when drawing conclusions about this population. Nonetheless, the results of the present study contribute to the growing body of literature indicating that among PEHPH, the experiences and challenges of those who identify as women differ from those who identify as men (Andermann et al., 2021).

Implications

The results of the present study have several meaningful practical implications. This research has shown that among women who experience homelessness and precarious housing, there is an important connection between higher-quality social relationships and better subjective cognition. Since women in this population face heightened marginalization relative to men (Bretherton, 2017; Calsyn & Morse, 1990; Mayock et al., 2015), strengthening their subjective cognition may be particularly beneficial in helping to empower them, foster their participation in high-quality relationships and reduce their involvement in low-quality relationships. This may also play a role in supporting women's ability to navigate or avoid potentially harmful intimate relationships, which is important not only due to the serious physical and emotional impacts that such experiences can have, but also because these relationships are a well-documented contributor to women's risk of homelessness (Andermann et al., 2021).

The At Home/Chez Soi study tested a Housing First model in Canada, which incorporates affordable housing with case management to provide holistic sustainable solutions, finding that it increases the QoL of PEHPH (Goering et al., 2014). However, its efficacy is largely supported by research conducted with mostly men participants (Goering et al., 2014). Authors highlight the need for studies examining the specific experiences of women in the population of PEHPH (Schwan et al., 2020), and interventions tailored to meet their needs (Andermann et al., 2021; Milaney et al., 2020; Winetrobe et al., 2017). The present study is a response to these calls. Our findings suggest that to increase the quality of social relationships of women specifically, interventions should actively seek to increase their subjective cognition. The results of this study also suggest that interventions aimed at helping PEHPH expand their social networks and reduce emotional distress may foster higher-quality social relationships for both men and women.

Homelessness is not just a lack of shelter; it is an experience that involves immense upheaval, insecurity, and stress (Gaetz et al., 2012), which almost inevitably erodes social relationships (Hawkins & Abrams, 2007). Improving social relationship quality can increase the overall QoL of PEHPH, which includes better quality of physical health, psychological wellbeing, and environmental conditions, as these domains are closely intertwined (WHO, 2012). Developing and implementing policies, services, and interventions that promote people's social relationship quality can reduce their distress and impairment, leading to fewer general and psychiatric hospitalizations across this population. Moreover, research suggests that addressing women's homelessness can generate long-term effects for people of all genders by reducing the intergenerational course that homelessness so often takes (Schwan et al., 2020). Such initiatives can serve public health while enhancing the QoL of PEHPH, particularly of women, who are among the most vulnerable individuals within one of society's most marginalized populations.

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Table 1

Sample Characteristics

Variable	Women (n = 46)			Men (n = 53)		
Categorical Variable	*n*	*%*		*n*	*%*	
Race/Ethnicity						
Black African	18	39		7	13	
White North American	9	20		24	45	
White European	10	22		6	11	
Black Caribbean	7	15		3	6	
South Asian	2	4		8	15	
Indigenous	0	0		3	6	
Mixed Heritage and Other	6	13		5	13	
Current Mental Health Disorders						
Substance Use Disorder	10	22		24	45	
Major Depressive Disorder	8	17		9	17	
Panic Disorder	8	17		4	8	
Obsessive-Compulsive Disorder	7	15		7	13	
Agoraphobia	7	15		5	9	
Alcohol Use Disorder	6	13		24	45	
Antisocial Personality Disorder	6	13		16	30	
Posttraumatic Stress Disorder	6	13		12	23	
Psychotic Disorders [1]	5	11		15	28	
Social Anxiety	5	11		9	17	
Generalized Anxiety Disorder	4	9		4	8	
Bipolar Disorder	2	4		3	6	
Residence						
Emergency shelter	33	72		23	43	
Own apartment or house	7	15		11	21	
Hotel/motel	4	9		3	6	
Transitional housing program	2	4		8	15	
Family member or friend's home	1	2		5	9	
On the streets or other outdoor place	1	2		4	8	
Group home	0	0		1	2	
Corrections halfway house	0	0		1	2	
Continuous Variable (Scale)	*M*	*SD*	*Range*	*M*	*SD*	*Range*
Age	39.76	12.35	20-71	46.92	16.10	0-70
Years of Education	13.22	3.26	0-18	12.73	3.85	0-21
Social Relationship Quality (WHOQOL-BREF)	54.71	23.94	8-100	48.11	25.03	0-83
Social Network Size (LSNS)	9.65	6.11	0-28	9.19	6.42	0-23
Emotional Distress (HADS)	15.17	7.13	1-31	15.17	7.62	4-37
Subjective Cognition (PROMIS)	30.11	8.76	8-40	27.77	7.42	9-40

Note: The sum of the racial identities reported equals greater than 100%as participants could report more than one race/ethnicity; [1] Includes Mood Disorder with Psychotic Features and Major Depressive Disorder with Psychotic Features; WHOQOL-BREF: World Health Organization Quality of Life Brief Version; LSNS: Lubben Social Network Scale; HADS: Hospital Anxiety and Depression Scale; PROMIS: Patient Reported Outcomes Measurement Information System; the sum of percentages for categorical variables exceeds 100% as participants could select more than one option.

Table 2

Pearson Correlations of Social Relationship Quality

Gender	Variable (Scale)	WHOQOL-BREF	LSNS	HADS
Women	Social Network Size (LSNS)	.47**		
	Emotional Distress (HADS)	-.69***	-.36*	
	Subjective Cognition (PROMIS)	.60***	.19	-.67***
Men	Social Network Size (LSNS)	.40**		
	Emotional Distress (HADS)	-.49***	-.48***	
	Subjective Cognition (PROMIS)	.17	.23	-.48***

Note: Women: $n = 46$; Men: $n = 53$; Social Relationship Quality was measured using the WHOQOL-BREF: World Health Organization Quality of Life Brief Version; LSNS: Lubben Social Network Scale; HADS: Hospital Anxiety and Depression Scale; PROMIS: Patient Reported Outcomes Measurement Information System; * indicates $p < .05$; ** indicates $p < .01$; *** indicates $p < .001$

Table 3

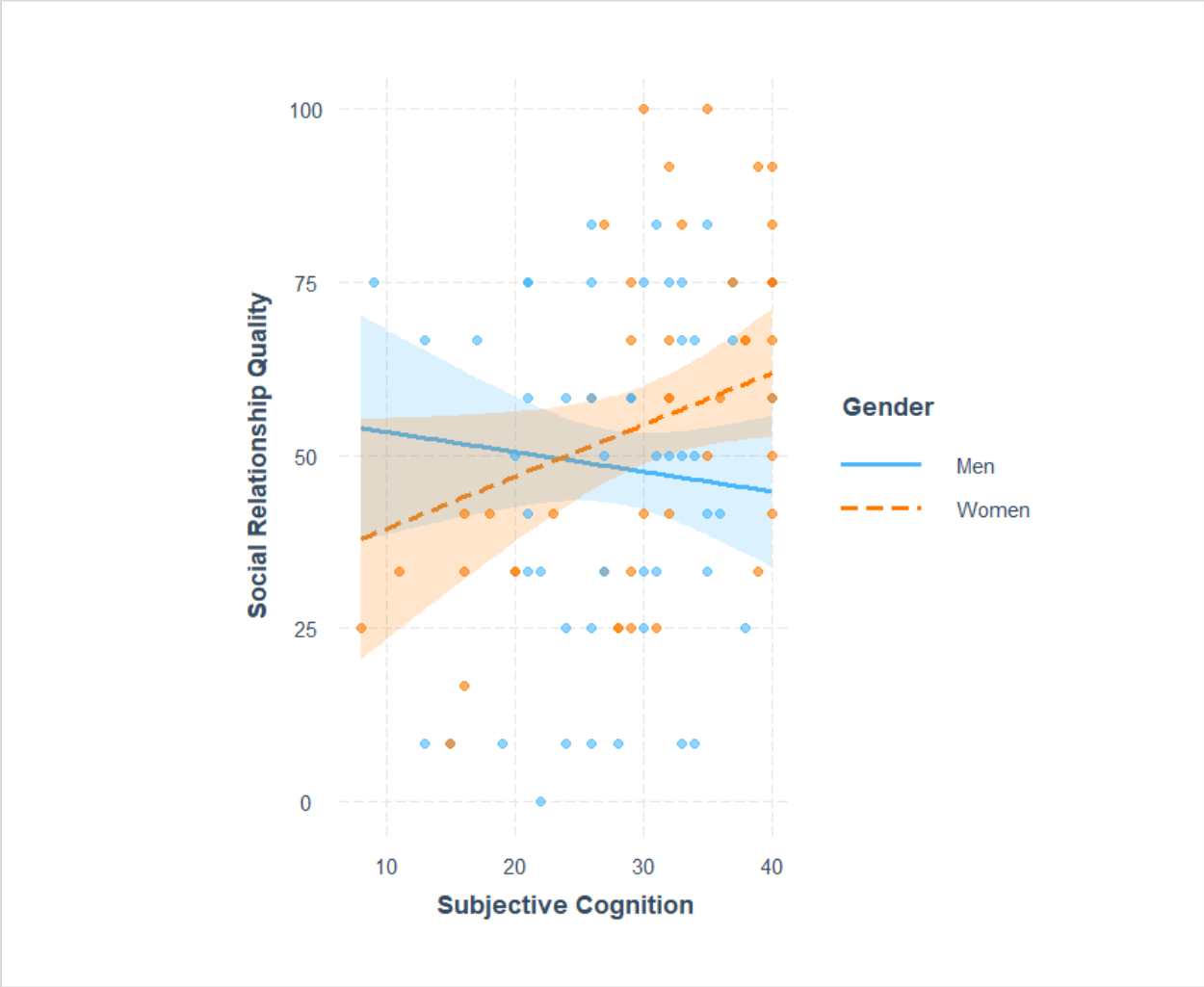
Model Summary: Multiple Linear Regression of Social Relationship Quality

Variable (Scale)	*B*	*SE*	*β*	*t*	*p*	*95% CI: B*
Intercept	68.415	14.756	-0.123	4.636	<.001	39.112, 97.717
Social Network Size (LSNS)	0.943	0.345	0.239	2.733	.008	0.258, 1.627
Emotional Distress (HADS)	-1.386	0.348	-0.414	-3.988	<.001	-2.076, -0.696
Subjective Cognition (PROMIS)	-0.286	0.393	-0.094	-0.728	.468	-1.065, 0.494
Subjective Cognition*Gender	1.035	0.488	0.341	2.120	.037	0.066, 2.004

Note. Women: $n = 46$; Men: $n = 53$; Social Relationship Quality was measured using the WHOQOL-BREF: World Health Organization Quality of Life Brief Version; LSNS: Lubben Social Network Scale; HADS: Hospital Anxiety and Depression Scale; PROMIS: Patient Reported Outcomes Measurement Information System, Cognitive Function; the reference group is women for the interaction term.

Figure 1

Simple Slopes Interaction



Note: The interaction term is significant (p = .037); the association between social relationship quality and subjective cognition is significant for women (p = .047) but not for men (p = .468).