

Effects Of Gender, Relationship-Need And Work-Life Balance On Felt Loneliness. EU-Loneliness-Survey

Theoretical Framework:

Loneliness is defined as the perceived gap between desired and actual social connections. Research indicates that women report higher relationship needs than men (Caldwell & Peplau, 1982; Fehr, 2011), which may partially explain observed gender differences in loneliness. Empirical studies show that women tend to report higher loneliness across the lifespan (Nicolaisen & Thorsen, 2024; Hernández-Díaz, Navarro-Vásquez, Aguilar-Latorre, Méndez-López, Gascón-Santos, & Magallón-Botaya, 2025), whereas men may experience loneliness but are often less willing to disclose it due to social stigma (Borys & Perlman, 1985; Lau & Gruen, 1992; Barretto et al., 2021).

Friendship styles differ between genders: women typically engage in face-to-face, emotionally intimate interactions, which protect against loneliness, while men often prefer side-by-side activities that involve less emotional sharing (Caldwell & Peplau, 1982; Hays, 1984). These differences suggest that women's higher relationship need could mediate the association between gender and loneliness. The present study tests this mediation model empirically, with gender as the independent variable, relationship need as the mediator, and loneliness as the dependent variable.

Work-life balance (WLB) influences loneliness through psychological strain caused by role overload, where work and family demands exceed personal resources (Chuang, Chiang, & Lin, 2024; Fostervold, Ulleberg, Nilsen, & Halberg, 2024). Poor WLB increases work-family conflict and role overload, which in turn elevate feelings of loneliness. This study tests the association using a linear regression model, with WLB predicting loneliness.

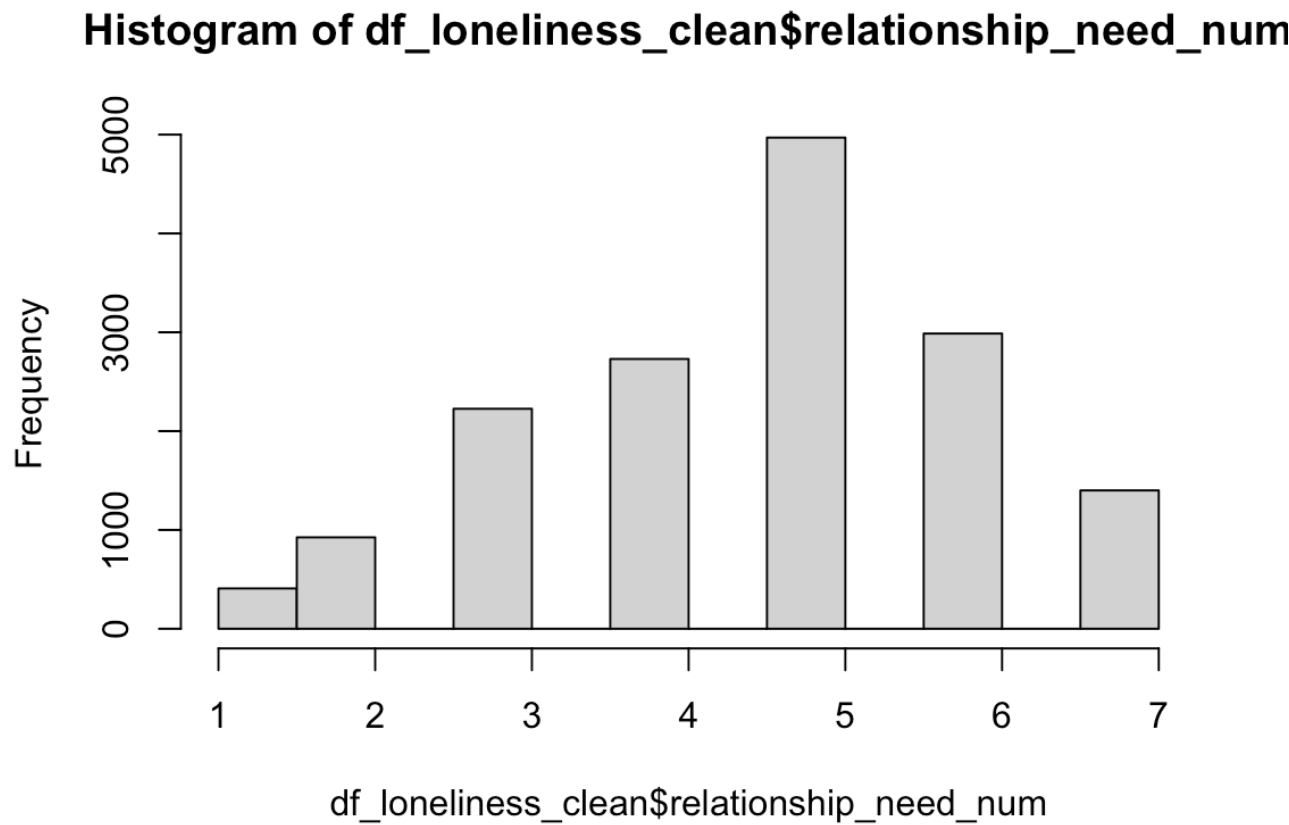
Analysis Protocol:

Prior to analysis, the dataset will be cleaned and prepared. Cases with missing values on relevant variables will be handled via listwise deletion. Multi-item scales will be reverse-coded where necessary to ensure consistent directionality, and scale reliability may be checked using Cronbach's alpha. Descriptive statistics will be computed for all study variables, including age (range, mean, median, standard deviation), and frequencies for categorical variables such as gender and work-life balance (WLB). For the mediation analysis, only participants identifying as male or female will be included; non-binary or other responses will be excluded. Outliers exceeding ± 3 standard deviations from the mean will be inspected and addressed if necessary. For the mediation analysis, gender will serve as the predictor, relationship_need as the mediator, and loneliness as the outcome. For the linear regression analysis, WLB will be the predictor and loneliness the outcome. Before conducting analyses, assumptions will be checked, including linearity between predictors and outcomes, approximate normality of residuals, and potential multicollinearity between predictor and mediator for the mediation model. Homoskedasticity will be checked for the regression but is not critical for the mediation analysis using bootstrapped indirect effects.

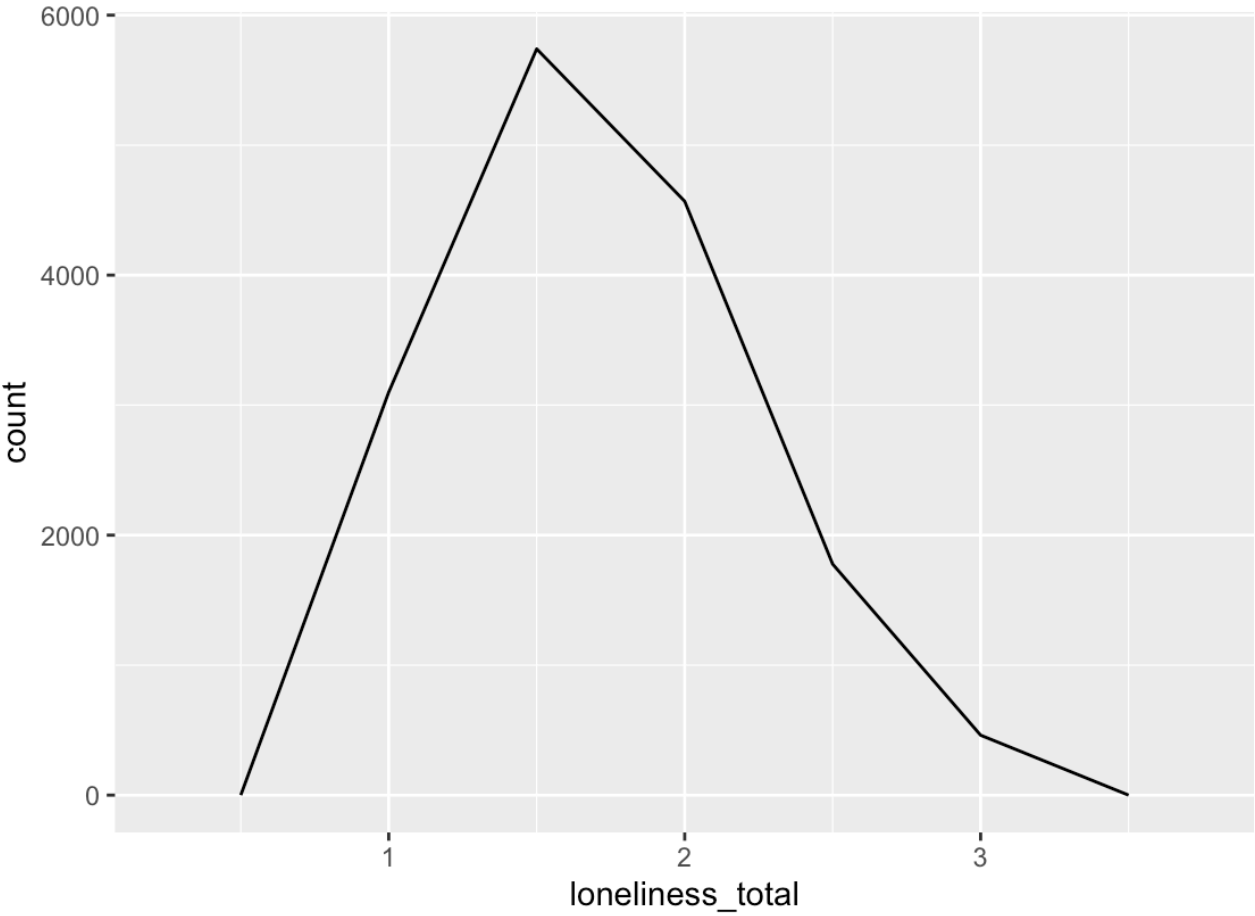
All analyses will be conducted in R, using the packages mediation, dplyr, ggplot2, psych, car, and tidyr.

Pre-Analysis:

Histogram of relationship-need:

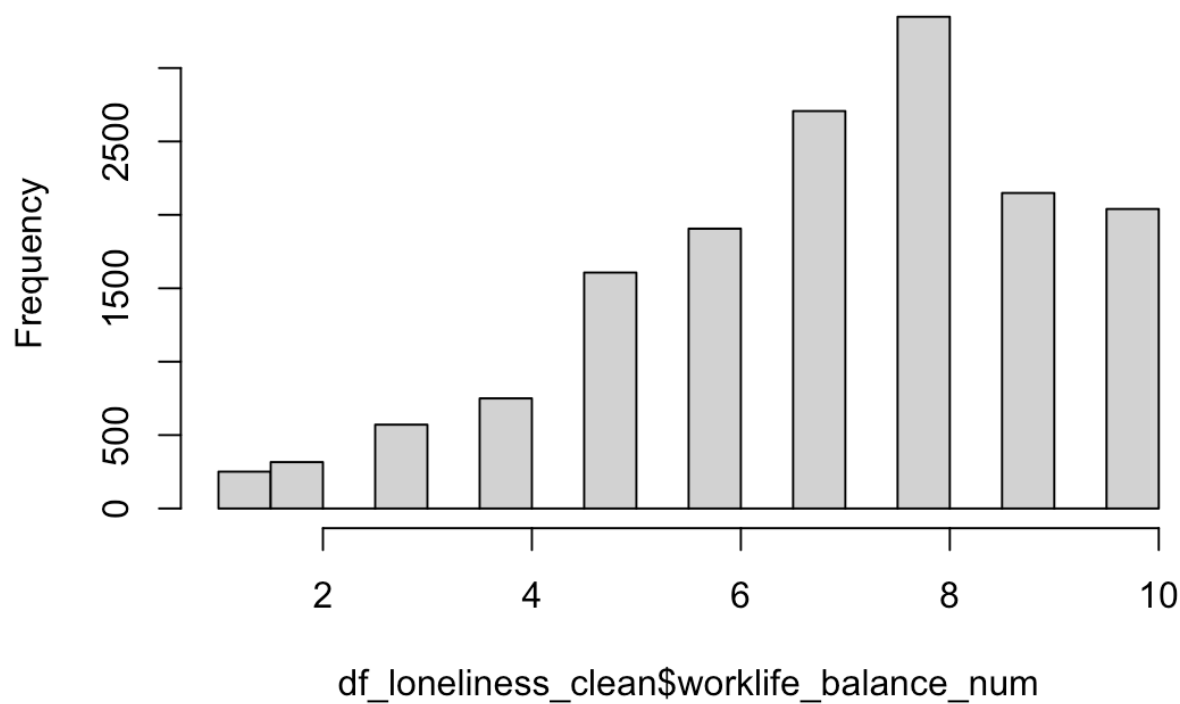


Frequency Loneliness-Total:

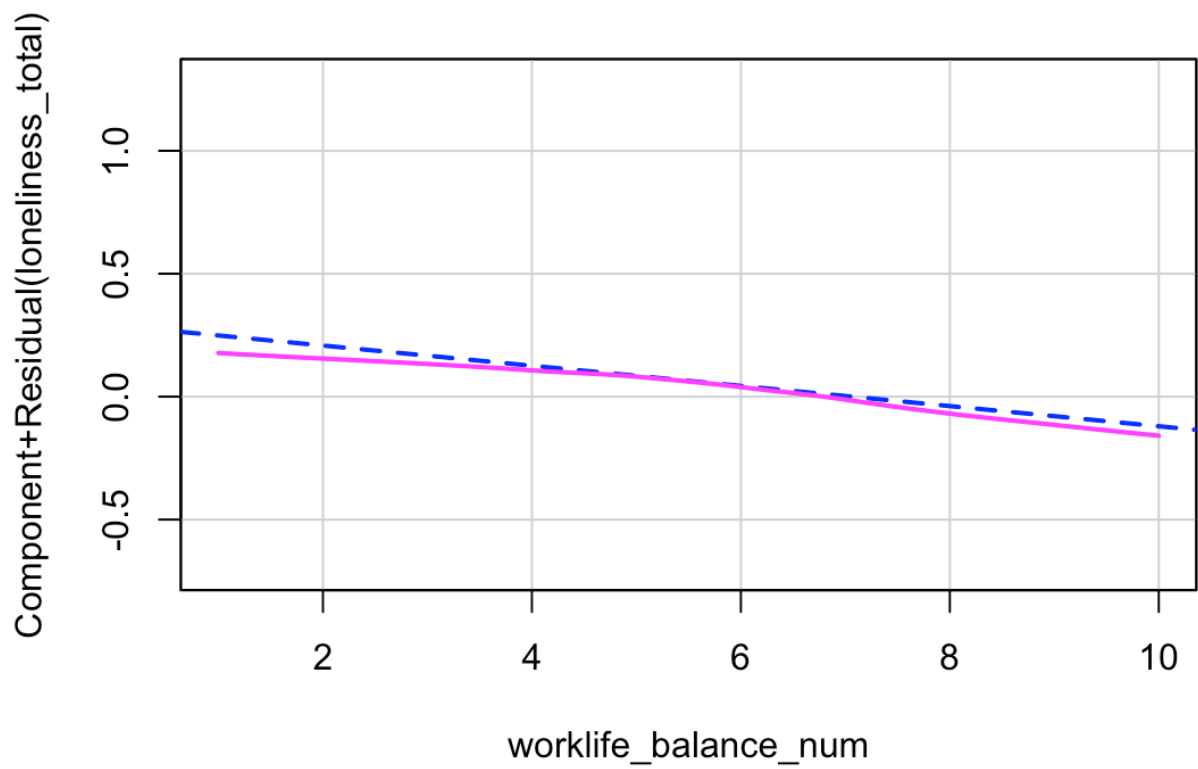


Histogram of Work-Life-Balance:

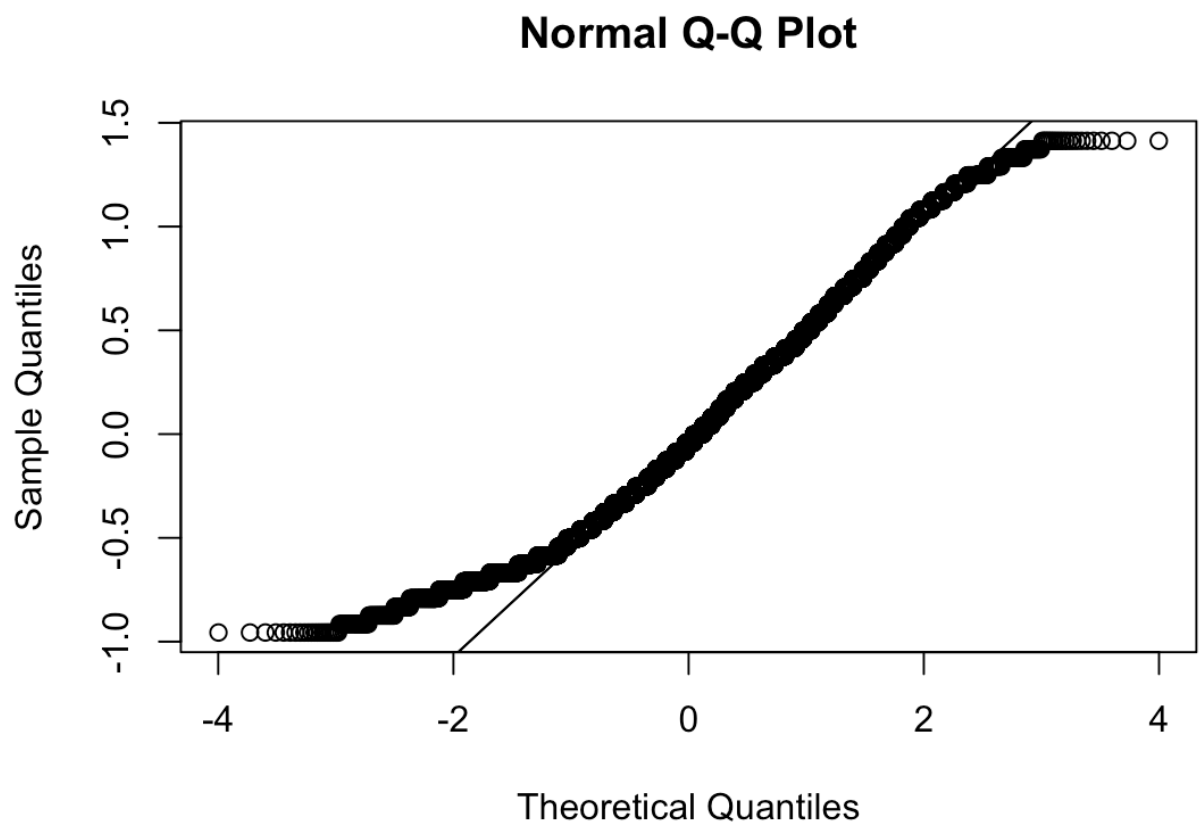
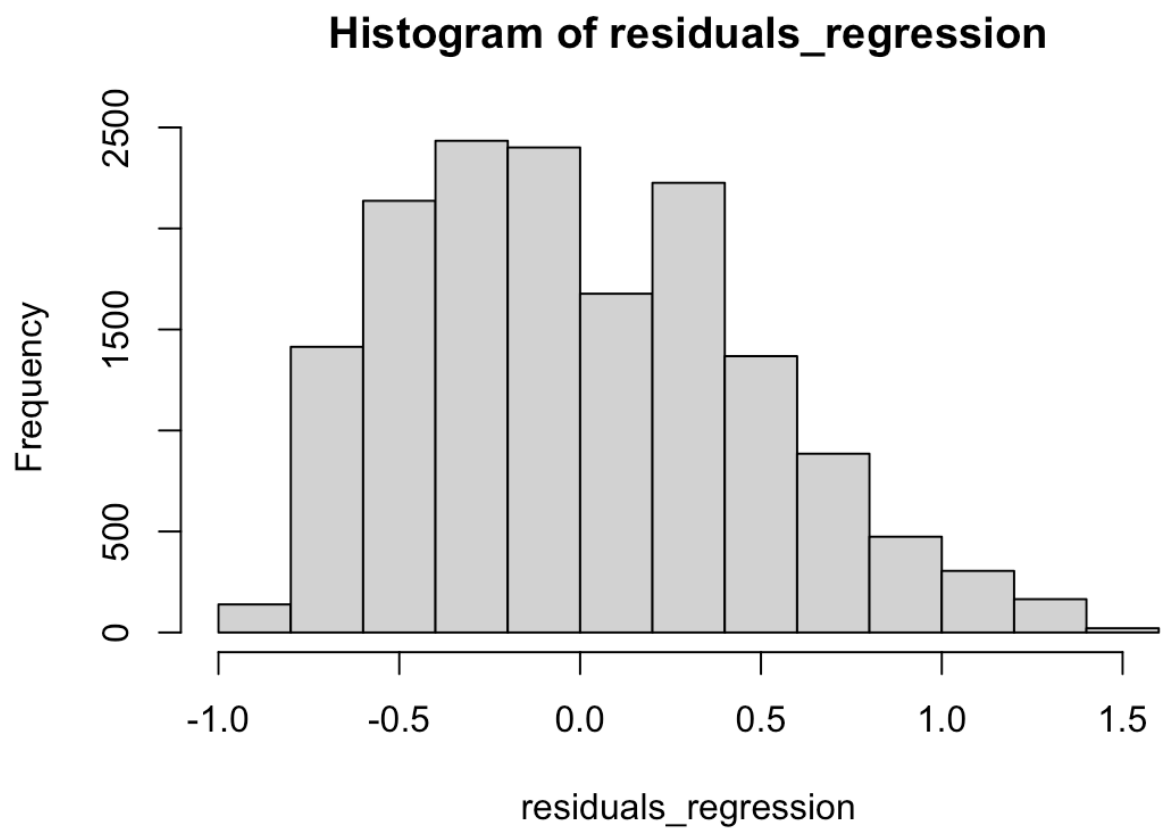
Histogram of df_loneliness_clean\$worklife_balance_num



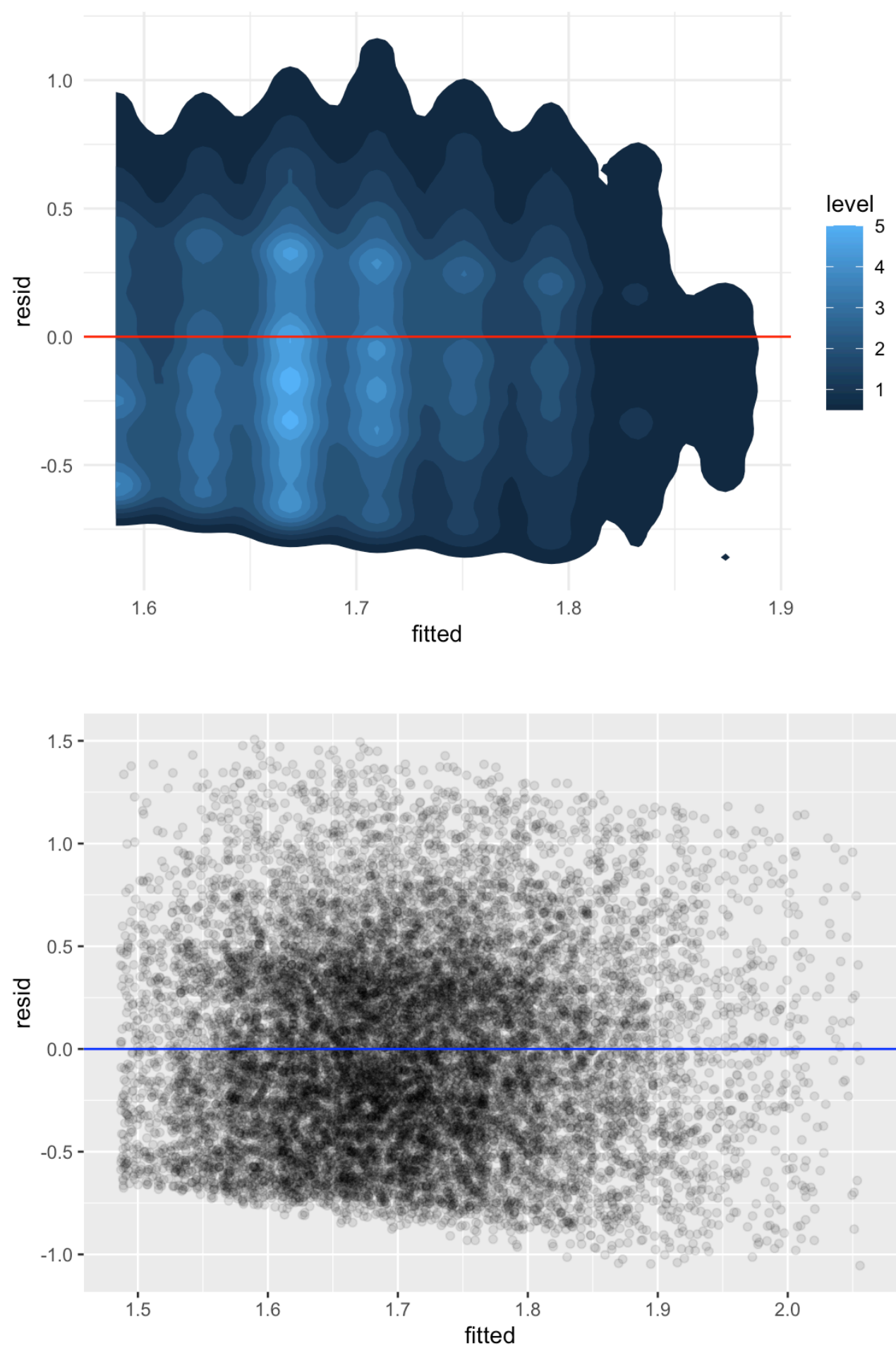
Linearity-regression:



Normal Distribution:



Homoskedasticity:



Testing multicollinearity for mediation-analysis:

```
correlation_mediation -> correlation < .7  
[1] 0.01440383
```

—> results show us that there is no multicollinearity

```
model_y_mediation <- lm(loneliness_total ~ gender_num + relationship_need_num, data =  
df_loneliness_clean)  
vif(model_y_mediation) -> vif < 5  
      gender_num relationship_need_num  
      1.000208      1.000208
```

—> results show us that there is no multicollinearity

This indicates that a mediation-analysis is feasible.

Results Regression:

Regression: loneliness_total ~ worklife_balance_num

Term	Estimate	Std. Error	t-value	p-value
Intercept	1.9970	0.0133	150.64	p < .001
worklife_balance_num	−0.0410	0.0018	−22.85	p < .001

Model Fit

Metric	Value
Residual SE	480
df Residual	15644
Multiple R ²	0.0323
Adjusted R ²	0.0322
F-Statistic	522
F-test p-value	p < .001

Interpretation:

The regression analysis examined the relationship between work-life balance and loneliness in a sample of 15,646 participants. A linear regression analysis showed that poorer work–life balance was associated with higher loneliness.

The model was statistically significant, $F(1, 15644) = 522, p < .001$, explaining 3.2% of the variance in loneliness ($R^2 = .03$). Poorer work–life balance significantly predicted higher loneliness ($\beta = -0.04, SE = 0.002, t = -22.85, p < .001$).

The model explains only around 3.2% of the variance in loneliness, suggesting that while better work-life balance is linked to slightly lower loneliness, many other factors also contribute. Overall, the findings highlight a meaningful yet modest inverse relationship between work-life balance and feelings of loneliness.

Results Mediation:

Causal Mediation Analysis (Quasi-Bayesian, 1000 simulations)

Effect	Estimate	95% CI Lower	95% CI Upper	p-value
ACME	−0.00066	−0.00147	0.00005	$p = .076$
ADE	0.02813	0.01206	0.04510	$p < .001$
Total Effect	0.02747	0.01149	0.04429	$p < .001$
Prop. Mediated	−0.02392	−0.08045	0.00197	$p = .076$

Additional Info

Metric	Value
Sample Size	15646
Simulations	1000

Interpretation:

A causal mediation analysis was conducted to test whether the mediator accounted for the association between work–life balance and loneliness. The indirect effect (ACME) was small and not statistically significant, $p = .076$. The direct effect remained significant (ADE = 0.028, 95% CI [0.012, 0.045], $p < .001$). The total effect was also significant (Total Effect = 0.027, 95% CI [0.011, 0.044], $p < .001$). The proportion mediated was not significant, $p = .076$.

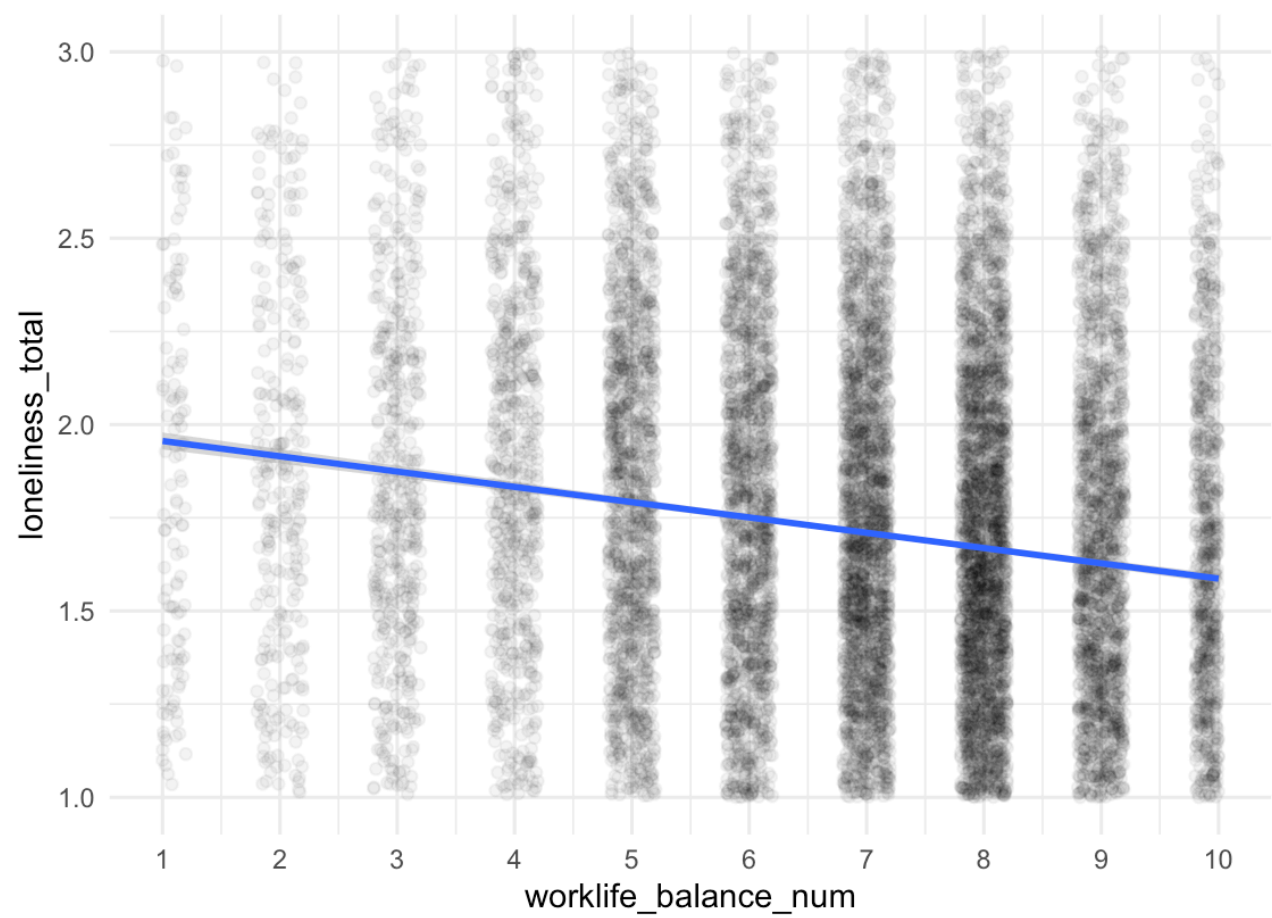
The mediation analysis shows that the mediator relationship-need (relationship_need_num) has almost no effect on the relationship between gender (gender_num) and loneliness (loneliness_total). The ACME (indirect effect) is very small and not statistically significant ($p = 0.076$), indicating that the pathway through the mediator is negligible.

The total effect is significant, but it is almost entirely driven by the direct effect. Only a very small, non-significant proportion of the effect is mediated. As the ADE is positive women in our sample show higher scores on loneliness.

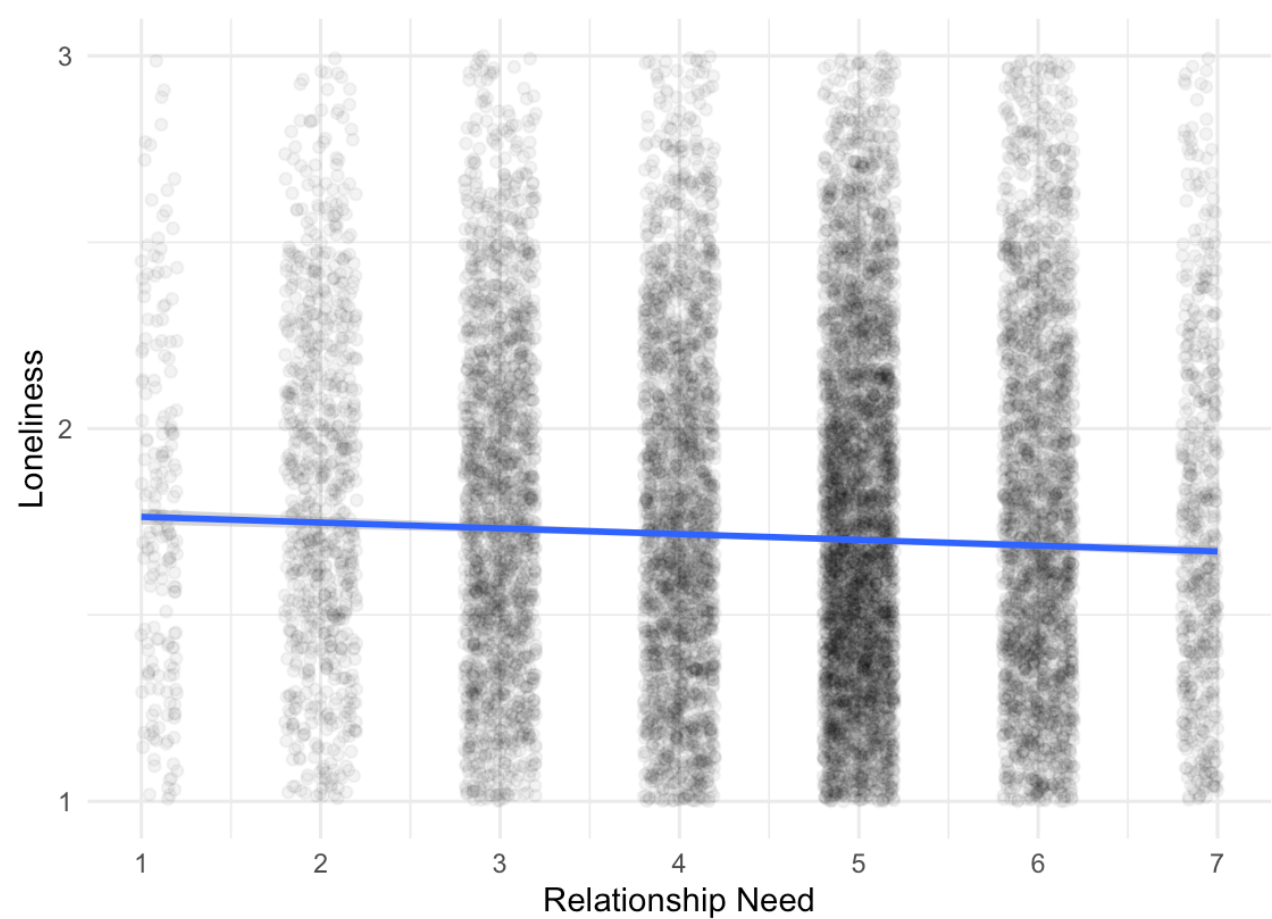
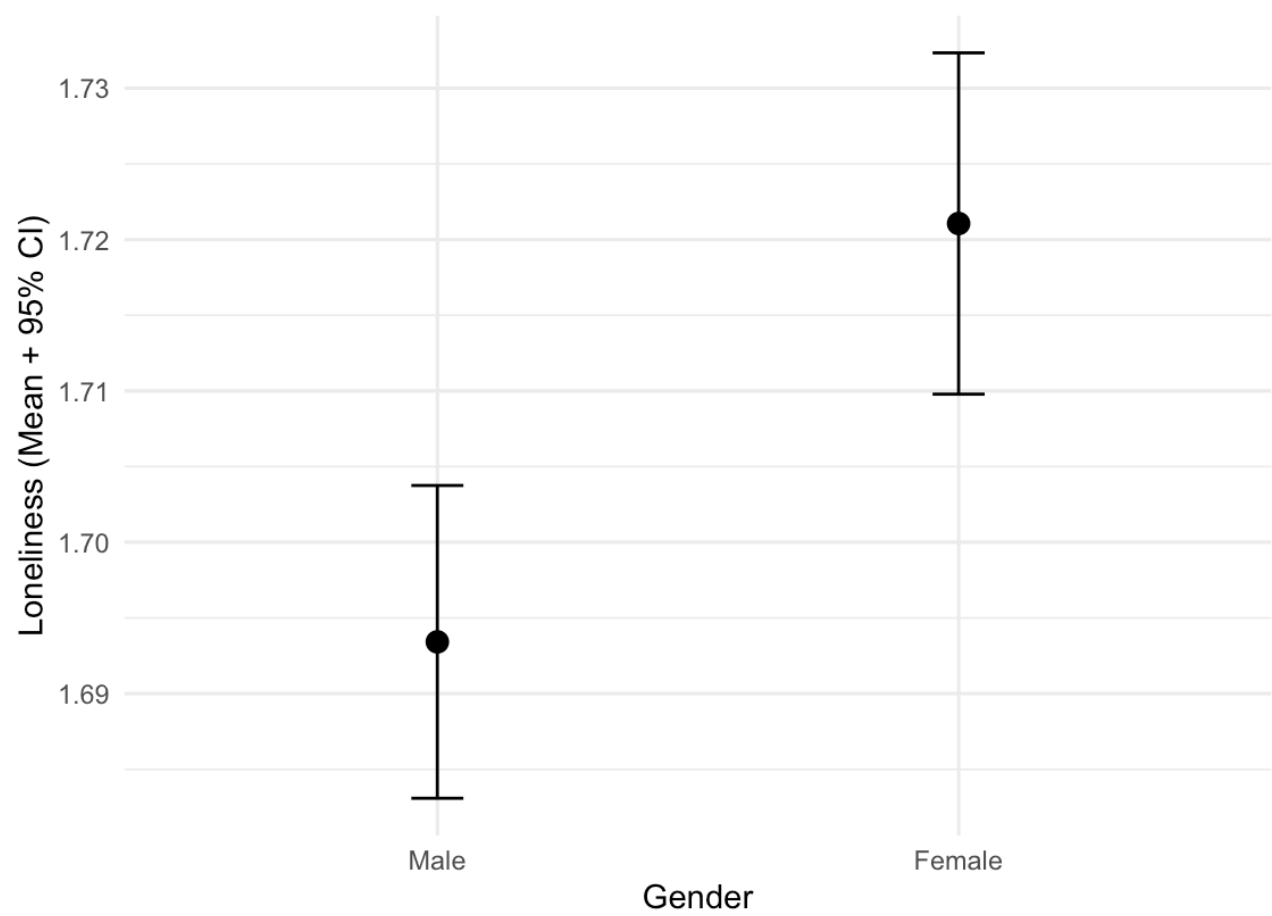
In total all effects, even the statistically significant ones, are rather small.

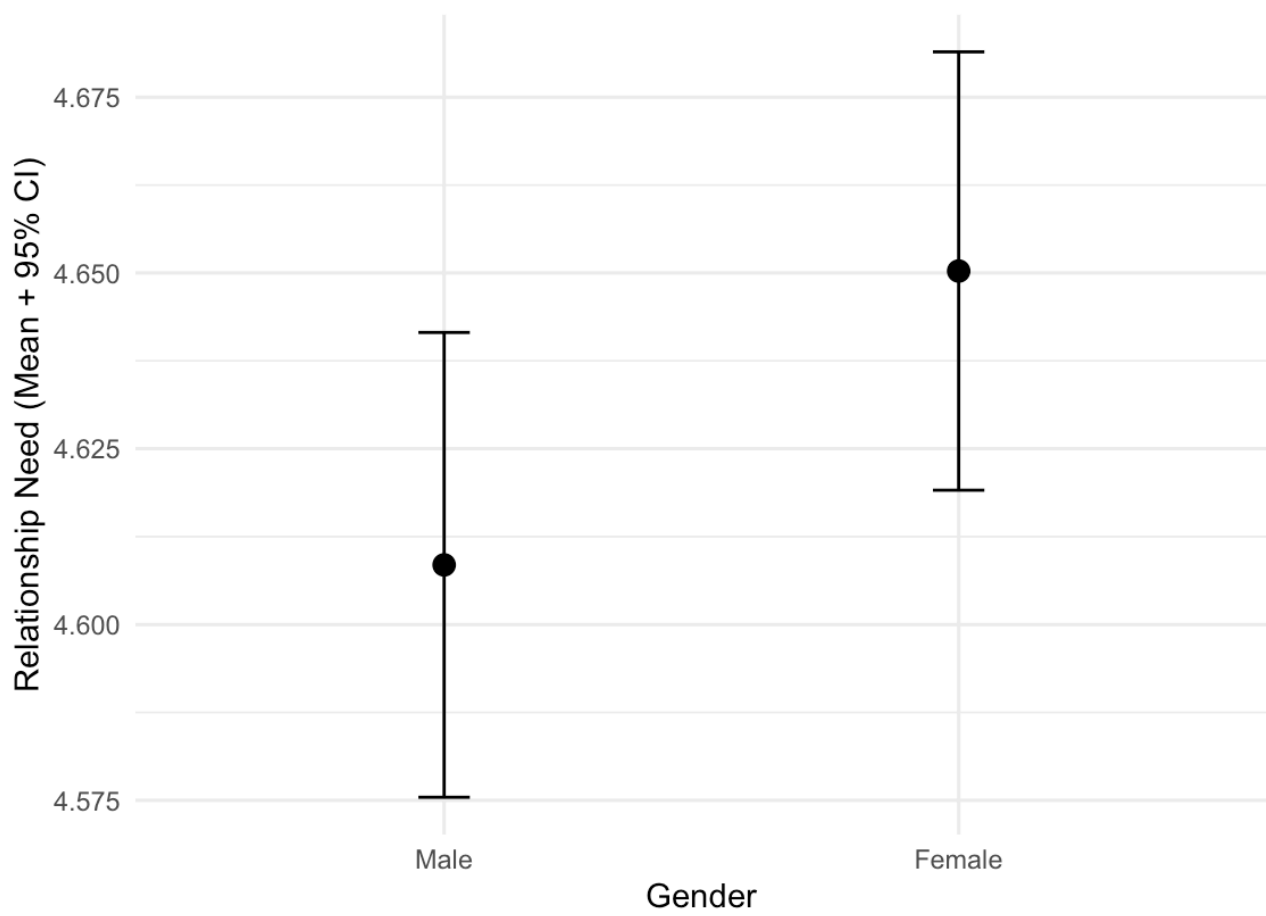
Figures

Regression:



Mediation-Analysis:





Conclusion and Limitations:

The present study examined two complementary pathways related to loneliness: (1) a mediation model in which gender differences in relationship-need were hypothesized to explain gender differences in loneliness, and (2) a regression model testing whether poorer work–life balance predicts higher loneliness. Together, these analyses provide a differentiated picture of how interpersonal and structural factors shape loneliness.

Consistent with previous literature, loneliness was associated with poorer work–life balance. Participants with lower work-life balance might experience a role overload that emphasize the strain created when work and family demands exceed personal resources (Chuang et al., 2024; Fostervold et al., 2024). The effect size was small but robust, suggesting that work–life balance represents as just a small contributor to loneliness. This finding supports the idea that loneliness is not solely an interpersonal problem but a multifaceted one influenced by structural and occupational pressures.

In contrast, the mediation model did not support the assumption that gender differences in relationship-need explain gender differences in loneliness. Although prior research indicates that women tend to report higher relationship-needs (Caldwell & Peplau, 1982; Fehr, 2011) and higher loneliness across the lifespan (Nicolaisen & Thorsen, 2024; Hernández-Díaz et al., 2025), the indirect effect was not statistically significant. These results suggest that the theorized mechanism of women's alleged higher relationship-need contributing to higher loneliness may be overly simplistic or incomplete.

One explanation is that gender differences in loneliness are driven less by relationship-need and more by sociocultural norms around emotional expression. Prior studies indicate that men often underreport loneliness due to stigma, emotional norms, and socialization toward self-reliance (Borys & Perlman, 1985; Lau & Gruen, 1992; Barretto et al., 2021). Such reporting biases can attenuate observed gender differences and suppress mediation effects. Additionally, gendered friendship styles may play a role: women's face-to-face, emotionally expressive friendships (Hays, 1984) may buffer loneliness even when relationship-needs are high, as opposed to men's side-by-side friendships.

Taken together, the findings point to two key insights. First, work-life balance exerts a direct and consistent influence on loneliness, underscoring the importance of organizational and societal structures in shaping social well-being. Second, gender differences in loneliness appear to be more complex than a simple need-based explanation and likely involve emotional norms, stigma, and interaction styles that extend beyond the scope of relationship-need alone.

This study is limited by its cross-sectional design, which prevents causal inference. All variables were self-reported, making the results vulnerable to reporting biases, especially potential underreporting of loneliness among men. The mediation model relied on a simplified measure of relationship-need that may not capture its full conceptual complexity. Finally, work–life balance and loneliness were measured with limited item breadth, which may have constrained effect sizes.

Literature:

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4. Chuang, Y. T., Chiang, H. L., & Lin, A. P. (2024). Information quality, work–family conflict, loneliness, and well-being in remote work settings. *Computers in Human Behavior*, 154, 108149.
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