The Effects of Friendship on Subjective Well-Being: Analyzing Panel Data Using Asymmetric Fixed Effects Models

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Why Should We Be Concerned With Friendships and Subjective Wellbeing?

Loneliness (= perceived discrepancy between a person's desired and actual social relationships) as a growing social problem ...

- currently receives increasing scientific attention (BIB 2024)
- as well as **political** attention (e.g., "Die Strategie der Bundesregierung gegen Einsamkeit" (BMFSFJ 2023)

Assumptions:

- Protective function of friendships outside the family on mental and physical health (Sander et al. 2017, Lucchini et al. 2015)
- Friendships as social capital (Homans 1974)
- Decline in friendships linked to reduced social capital and political participation (Putnam 2000)
- Friendship networks fluctuate in composition and size over time, affecting subjective well-being

State of Research

- Studies demonstrate positive relationships of friendships and SWB (Demir et al., 2015; Pancheva & Vásquez, 2022)
- Past research mostly uses cross-sectional approaches, which due to possible selection effects and confounding – might not capture the causal effects of the *changes* of friendships (Amati et al. 2018, Holt-Lunstad et al. 2010, Demir et al. 2015)
- Longitudinal studies using FE models find positive effects (Lucchini et al. 2015; Pancheva & Vásquez 2022; Landberg & Recksiedler 2018, Mader & Franzen 2022)
- However: Estimation and interpretation of results as the effect of increasing the treatment variable friendships by one unit ("+1 interpretation")

The "+1-Interpretation"

One coefficient / symmetric effects



Estimands and Hypotheses

Friends can not only be found but also lost throughout life! Processes of friendship formation and dissolution are quite different

- Losing a friend: Conflicts or disagreements, different interests or just "Growing apart over time", changes in life circumstances
- Finding a friend:

Getting to know each other, opportunities (life transitions and changing social contexts)

We apply the reasoning of **Prospect Theory** (Kahneman & Tversky 1979) to our research question, specifically focusing on **Loss aversion**:

The loss of something is perceived more strongly on an emotional level than the gain of something [and thus losses are avoided more strongly].

Estimands and Hypotheses



H1a: An increasing number of friendships over time leads to an improvement in subjective well-being.

H1b: A decreasing number of friendships over time leads to a decline in subjective well-being.

H2: The effect size on subjective well-being is *asymmetric*.

The loss of a friend has a stronger negative impact on subjective well-being than the positive impact of finding a friend.

Estimands and Hypotheses

Asym. effects + dimin. marg. utility $|\beta_{-}| > |\beta_{+low}| > |\beta_{+high}|$ + $\beta_{\text{+high}}$ β_{+low} SWB 0 0 (friends lost) (friends found) Number of close friends

H1a: An increasing number of friendships over time leads to an improvement in subjective well-being.

H1b: A decreasing number of friendships over time leads to a decline in subjective well-being.

H2: The effect size on subjective well-being is *asymmetric.* The loss of a friend has a stronger negative

impact on subjective well-being than the positive impact of finding a friend.

H3: As the number of friends grows, the additional effect of each new friend diminishes, while the impact of losing friends remains constant.

Data: The German Socio-Economic Panel (V38.1)

Sample selection

- Inclusion of survey years 2013, 2015, 2017, 2018, 2020 and 2021
- ≥ 2 observations / person
- N_{Persons} = 29,561; N_{Person-years} = 113,506

Outcome: SWB

 "Now we would like to ask you about your satisfaction with your life in general. How satisfied are you with your life, all things considered?" (0 "Completely dissatisfied" – 10 "Completely satisfied")

Treatment: (Intraindividual change in) the number of close friends

- "How many close friends would you say that you have [, and how many of them are co-workers]?"
- Recorded openly as a count variable

Method: Asymmetric fixed effects models (Allison 2019)

- Starting point: First difference model (symmetric)

$$Y_{i2} - Y_{i1} = (\mu_2 - \mu_1) + \beta (X_{i2} - X_{i1}) + (\varepsilon_{i2} - \varepsilon_{i1})$$

- First difference model (asymmetric)

$$Y_{i2} - Y_{i1} = (\mu_2 - \mu_1) + \beta^{pos} X_i^{pos} + \beta^{neg} X_i^{neg} + (\varepsilon_{i2} - \varepsilon_{i1})$$

- Multi period case with cumulative values

$$Z_{it}^{pos} = \sum_{s=1}^{t} X_{it}^{pos}; \ Z_{it}^{neg} = \sum_{s=1}^{t} X_{it}^{neg}$$

$$Y_{it} - Y_{it-1} = (\mu_{it} - \mu_{it-1}) + \beta^{pos} Z_{it}^{pos} + \beta^{neg} Z_{it}^{neg} + (\varepsilon_{it} - \varepsilon_{it-1})$$

 Consideration of diminishing marginal utility (quadratic terms) and the age-periodcohort problem (macro instead survey-year dummies)

Asymmetric Linear FE Model for Multiperiod Data: Data Matrix and Operationalization of Treatment

Person	Wave	Friends	Friends+	Friends-	Friends_cumul+	Friends_cumul-
1	1	4	0	0	0	0
1	2	5	1	0	1	0
1	3	5	0	0	1	0
1	4	6	1	0	2	0
1	5	3	0	3	2	3
1	6	2	0	1	2	4

Directed Acyclic Graph



Z_i contains time-varying control variables:

- Age
- Children
- Partnership
- Income
- Health
- Relocation
- Unemployment / employment level / job changes
- Survey year dummies or macro-variables (unemployment rate; Δ GDP; COVID-related contact restrictions)
 - \rightarrow APC-problem

Descriptive Results



N = 113.506

Results of Multi-period Models

Predicted Values



Source: SOEP-CORE Version 38.1. Own calculations.

Results of Multi-period Models

Predicted Values

Conditional Marginal Effects



Source: SOEP-CORE Version 38.1. Own calculations.

Conclusion

Key takeaways

- The gain of a friend has a significantly positive effect on SWB, while the loss has a significantly negative effect.
- But: Effect sizes are quite small!
- No evidence that the loss of a friend has a stronger negative impact on subjective well-being than the positive impact of gaining a friend.
- Also no asymmetric effects in robustness analyses:
 - First difference models with neighboring panel waves
 - Asymmetric operationalization of control variables
 - Macro-variables instead of period dummies
- Focus here only on the *quantity* of friends, but not on the *intensity* of the friendships
- Limitations: Unspecific question stimulus in the GSOEP
 - \rightarrow What is a "close" friend? Should friendships within the family be included?

Conclusion

Methodological Reflections

- In FE models with categorical treatments, state changes are usually clearly defined (e.g., becoming unemployed ≠ getting out of unemployment; getting married ≠ getting divorced)
- However, such distinctions are rarely made for metric or count treatments!
- Panel data contain more information through their temporal sequence than is typically utilized
- Asymmetric models have so far found relatively few practical applications (But: Kratz 2024)
- Also useful for analyzing repeated cross-sectional data when investigating the influence of macro-variables (e.g., effects of increasing and decreasing inequality in a society)
- Limitations: Potential bias when asymmetric effects are pronounced.
 E.g., a change from "0" between two waves, for example, could result from an increase by a certain amount and a subsequent decrease by the same amount. Separating these would require finer data.

Thank you!



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