

Well-Being in Social Interactions: Examining Personality-Situation Dynamics in Face-to-Face and Computer-Mediated Communication

The data for this study were collected in three cohorts of students (Fall 2017, Spring 2018, Fall 2020). We first preregistered all analyses for the first dataset collected in Fall 2017 (“Preregistration.pdf”). Subsequently, we updated our hypotheses and analytical strategy for the analysis of the second dataset collected in Spring 2018 (“Addendum.pdf”). Originally, we had planned to publish the results from only these two datasets. However, in the course of the review process, we were advised to change our analytical strategy substantially. To test the robustness of the revised results, we decided to replicate all findings in a third dataset collected in Fall 2020, for which we preregister all hypotheses and analyses below. The hypotheses are based on a fixed-effects meta-analysis of the results obtained in S1 and S2. Note that the third dataset was collected during the COVID-19 pandemic which may potentially affect the results.

1) Data collection. Have any data been collected for this study already?

The data was collected between Oct 21 and Nov 19, 2020. We ran descriptive analyses to generate feedback reports for participants, but we have not run any of the analyses described below.

2) Hypothesis. What's the main question being asked or hypothesis being tested in this study?

This study aims to examine how different types of social interactions are related to well-being on the within- and between-person level and whether personality traits moderate these effects.

In Analysis 1, we will (a) compare any kind of social interaction with no social interaction. Next, we will distinguish between different types of social interactions by (b) comparing Face-to-Face (FtF) interactions, computer-mediated communication (CMC), and mixed (i.e., FtF + CMC) episodes with no social interaction, and (c) comparing interactions with family members, close peers (i.e., friends, roommates, significant others), and weak ties (i.e., classmates, co-workers, strangers) with no social interaction. For all three analyses (a-c), we will examine whether personality traits moderate the effects of (different types of) social interactions. The hypotheses are listed in Table 1.

In Analysis 2, we will zoom in on the contextual factors by examining whether the effect of mode of communication depends on the type of interaction partner. To this end, we will exclude all observations during which no interaction took place and estimate the effects of mode of communication and type of interaction partner simultaneously in one model. The hypotheses are shown in Table 2.

Table 1
Hypotheses for Analysis 1

		WP	BP	Cross-level interaction
Social interaction		Individuals report higher well-being after engaging in any kind of social interaction compared to no social interaction.	/	The positive within-person effect of social interactions is higher in individuals with high levels of neuroticism.
Mode of communication	FtF	Individuals report higher well-being after engaging in FtF interactions compared to no social interaction.	Individuals who engage in FtF interactions more often show higher well-being on average.	The positive within-person effect of FtF interactions is higher in individuals with high levels of neuroticism.
	CMC	/	Individuals who engage in CMC more often show lower well-being on average.	/
	Mixed	Individuals report higher well-being after mixed episodes compared to no social interaction.	Individuals who report mixed episodes more often show higher well-being on average.	The positive within-person effect of mixed episodes is higher in individuals with high levels of neuroticism.
Type of interaction partner	Family	Individuals report higher well-being after interactions with family members compared to no social interaction.	/	The positive within-person effect of family members is higher in individuals with high levels of neuroticism.
	Close peers	Individuals report higher well-being after interactions with close peers compared to no social interaction.	/	The positive within-person effect of close peers is higher in individuals with high levels of neuroticism.
	Weak ties	Individuals report higher well-being after interactions with weak ties compared to no social interaction.	/	The positive within-person effect of weak ties is higher in individuals with high levels of neuroticism.

Note. The hypotheses for the WP and BP effects were derived from models without personality. WP = within-person; BP = between-person. / = no hypothesis.

Table 2
Hypotheses for Analysis 2

		WP	Cross-level interaction
Mode of communication	CMC	Individuals report lower well-being after engaging in CMC compared to FtF interactions.	The negative within-person effect of CMC is more pronounced in individuals with high levels of neuroticism.
	Mixed	/	/
Type of interaction partner	Family	/	/
	Weak ties	Individuals report lower well-being after interactions with weak ties compared to interactions with close peers.	/
Mode of communication × Type of interaction partner	CMC × Weak ties	The negative within-person effect of CMC (compared to FtF) is smaller during interactions with weak ties compared to interactions with close peers.	/

Note. The hypotheses for the WP effects were derived from models without personality. WP = within-person. / = no hypothesis.

3) Dependent variable. Describe the key dependent variable(s) specifying how they will be measured.

Dependent variable

Momentary well-being was measured using four items. The items consisted of the item stem “RIGHT NOW, I am feeling“ which was followed by one of the four adjectives “angry”, “worried”, “happy”, or “sad”. All items were answered on a 4-point scale (1 = *Not at all*, 2 = *A little bit*, 3 = *Quite a bit*, 4 = *Very much*).

Following Schimmack (2009), we will calculate a measure of affect balance by subtracting the average of the three negative items from the positive item. In addition, we will analyze all four adjectives separately to determine whether the findings are driven by specific emotions (see Question 8).

Other variables

Social interaction:

Participants indicated whether or not they had interacted with others during the past hour. An interaction was defined as: “an exchange between two or more people that lasts at least 5 minutes, including interactions on a smartphone or computer (e.g., talking on the phone, texting, chatting, social media)“.

Mode of communication:

Mode of communication was measured using the following item: “I spent time interacting with others by (check all that apply):” The response options were: 1 = *Talking in person*; 2 = *Talking on the phone*; 3 = *Texting (e.g., SMS, Whatsapp)*; 4 = *Chatting on a dating app*; 5 = *Emailing*; 6 = *Video-chatting*; 7 = *Social media*; 8 = *None of the above, other*. Participants could select all options that applied to them in any given situation. Alternatively, they could select *Skip question*. We will create three categories: (1) FtF (*Talking in person*), (2) CMC (any combination of response options 2-7), and (3) mixed (*Talking in person* and any combination of response options 2-7). All measurement occasions when participants selected *None of the above, other* or *Skip question* will be excluded from the analyses regarding mode of communication.

Type of interaction partner:

Type of interaction was measured using the following item: “I was interacting with the following people (check all that apply):” The response options were: 1 = *Classmates, students*; 2 = *Co-workers*; 3 = *Family*; 4 = *Friends*; 5 = *Roommates*; 6 = *Significant other*; 7 = *Strangers*; 8 = *None of the above, other*. Again, participants could select all options that applied to them in any given situation. Alternatively, they could select *Skip question*. We will create three categories: (1) family (*Family*), (2) close peers (*Friends*; *Roommates*; and/or *Significant other*), and (3) weak ties (*Classmates, students*; *Co-workers*; and/or *Strangers*). All measurement occasions when participants selected *None of the above, other* or *Skip question* will be excluded from the analyses regarding type of interaction partner.

Personality:

Personality traits were measured using the Big Five Inventory–2 (BFI-2; Soto & John, 2017). The BFI-2 consists of 60 items, which can be averaged to calculate scores for the Big Five personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience.

Control variables

As part of our supplemental analyses (see Question 8), we will add gender (0 = *Male*, 1 = *Female*), ethnicity (0 = *Anglo/White only*, 1 = *Non-Anglo/White, multi-ethnic*), and SES (0 = *less than some college*, 1 = *at least one parent completed some college*) as control variables on Level 2.

We will include day of the week (i.e., 0 = *weekday*, 1 = *weekend day*) as a Level 1 control variable in all models.

4) Conditions. How many and which conditions will participants be assigned to?

Participants were not assigned to any conditions.

5) Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.

We will use Multilevel Structural Equation Modeling in *Mplus* Version 8.5 (Muthén & Muthén, 1998-2017) with Bayesian estimation.

Analysis 1: Effect of (different types of) social interactions compared to no social interaction

For all models in Analysis 1, we will separate within- from between-person effects via latent person-mean centering. For Analysis 1a, the model will be estimated as follows:

Within-level model:

$$Well - being_{ti} = \alpha_i + \beta_{1i}Social\ interaction_{ti}^c + \beta_2Weekend_{ti} + \varepsilon_{ti}$$

The outcome variable well-being at time t for person i is equal to a person-specific intercept (α_i), plus the person-specific *within-person* effect of social interactions (β_{1i}) multiplied with the within-level component of social interactions ($Social\ interaction_{ti}^c$), plus the within-person effect of weekend (β_2) multiplied with a dummy variable for weekday (0) vs. weekend (1), plus a time-point specific residual for person i (ε_{ti}). The within-level component of social interactions is obtained via latent person-mean centering. The residual is assumed to be normally distributed with constant variance for all people, $\varepsilon_{ti} \sim N(0, \sigma^2)$.

On the between-person level, the person-specific intercept and the person-specific within-person effect of social interactions are modelled as latent variables.

Between-level model:

$$\begin{aligned}\alpha_i &= \gamma_{00} + \gamma_{01}Social\ interaction_i^b + \gamma_{02}Personality_i^c + \mu_{0i} \\ \beta_{1i} &= \gamma_{10} + \gamma_{11}Personality_i^c + \mu_{1i}\end{aligned}$$

The person-specific intercept is equal to a fixed effect (γ_{00}), plus the *between-person* effect of social interactions (γ_{01}) multiplied with the between-level component of social interactions ($Social\ interaction_i^b$), plus the effect of personality on the intercept (γ_{02}), plus a person-specific random effect (μ_{0i}). The between-level component of social interactions is

conceptually similar to the person mean of social interactions corrected for measurement error. $Personality_i^c$ is grand-mean centered.

The person-specific within-person effect of social interactions is equal to a fixed effect (γ_{10}), plus the effect of personality on the slope (γ_{11}), plus a person-specific random effect (μ_{1i}).

We are interested in the following parameters:

- The **within-person effect of social interactions** (γ_{10}) indicates whether social interactions are related to momentary changes in well-being.
- The **between-person effect of social interactions** (γ_{01}) indicates whether individuals who interact more on average report higher well-being.
- The **effect of personality on the slope** (γ_{11}) indicates whether personality predicts the within-person effect of social interactions (i.e., the cross-level interaction).

In a first step, we will run a baseline model without personality (including only the within- and between-person effects of social interactions plus weekend as a control variable). In a second step, we will include the effects of personality on the intercept and on the slope as described above. We will run one separate model for each personality trait.

We will repeat the analyses using (b) separate dummies for FtF interactions, CMC, and mixed episodes, and (c) separate dummies for interactions with family members, close peers, and weak ties.

Analysis 2: Zooming into contextual factors

For Analysis 2, we will manually person-mean center the Level 1 predictors and compute their products to estimate the interaction terms. The model will be estimated as follows:

Within-level model:

$$\begin{aligned} Well - being_{ti} = & \alpha_i + \beta_{1i}CMC_{ti}^c + \beta_{2i}Mixed_{ti}^c + \beta_{3i}Family_{ti}^c + \beta_{4i}Weak\ ties_{ti}^c + \\ & \beta_{5i}CMC_{ti}^c \times Family_{ti}^c + \beta_{6i}CMC_{ti}^c \times Weak\ ties_{ti}^c + \\ & \beta_{7i}Mixed_{ti}^c \times Family_{ti}^c + \beta_{8i}Mixed_{ti}^c \times Weak\ ties_{ti}^c + \\ & \beta_9Weekend_{ti} + \varepsilon_{ti} \end{aligned}$$

The outcome variable well-being at time t for person i is equal to a person-specific intercept (α_i), plus the person-specific *within-person* effects of mode of communication (β_{1i} and β_{2i}) and type of interaction partner (β_{3i} and β_{4i}) multiplied with their respective person-mean centered variables, plus all possible interaction terms ($\beta_{5i} - \beta_{8i}$) multiplied with their respective product terms, plus the within-person effect of weekend (β_9), plus the time-point specific residual for person i (ε_{ti}).

On the between-person level, the person-specific intercept, the person-specific within-person effects of mode of communication and type of interaction partner, and the person-specific interaction terms are modelled as latent variables.

Between-level model:

$$\begin{aligned}\alpha_i &= \gamma_{00} + \gamma_{01}Personality_i^c + \mu_{0i} \\ \beta_{1i} &= \gamma_{10} + \gamma_{11}Personality_i^c + \mu_{1i} \\ \beta_{2i} &= \gamma_{20} + \gamma_{21}Personality_i^c + \mu_{2i} \\ \beta_{3i} &= \gamma_{30} + \gamma_{31}Personality_i^c + \mu_{3i} \\ \beta_{4i} &= \gamma_{40} + \gamma_{41}Personality_i^c + \mu_{4i} \\ \beta_{5i} &= \gamma_{50} + \gamma_{51}Personality_i^c + \mu_{5i} \\ \beta_{6i} &= \gamma_{60} + \gamma_{61}Personality_i^c + \mu_{6i} \\ \beta_{7i} &= \gamma_{70} + \gamma_{71}Personality_i^c + \mu_{7i} \\ \beta_{8i} &= \gamma_{80} + \gamma_{81}Personality_i^c + \mu_{8i}\end{aligned}$$

The person-specific intercept, the person-specific within-person effects of mode of communication and type of interaction partner, and the person-specific interaction terms are equal to a fixed effect (γ_{00} – γ_{80}), plus the effects of personality on the intercept (γ_{01}) and slopes (γ_{11} – γ_{81}), plus a person-specific random effect (μ_{0i} – μ_{8i}).

We are interested in the following parameters:

- The **within-person interaction terms** (γ_{50} – γ_{80}) indicate whether the within-person effects of mode of communication change as a function of the interaction partner.
- The **effects of personality on the interaction terms** (γ_{51} – γ_{81}) indicate whether personality predicts the degree to which mode of communication and type of interaction partner interact (i.e., the three-way interactions).

In a first step, we will run a baseline model without personality (including only the simple effects mode of communication and type of interaction partner and the within-person interactions plus weekend as a control variable). In a second step, we will include the effects of personality on the intercept and on the slopes as described above. We will run one separate model for each personality trait.

6) Outliers and Exclusions. Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

We will apply the same data cleaning procedures as in S1 and S2. Interactions with partners from multiple categories will be excluded from the main analyses but retained for the supplementary analyses.

7) Sample Size. How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

The data were collected as part of a Writing Assignment in an introductory Psychology class. As such, the sample size was limited by the number of students enrolled in the class ($N = 1,177$).

8) Other. Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

Due to the high number of statistical tests, we will use an alpha level of .01 for all tests. To synthesize across datasets, we will run a fixed-effects meta-analysis across the three studies.

We will run the following supplementary analyses:

- Analyzing the four well-being adjectives (angry, worried, happy, sad) separately to determine whether the findings are driven by specific emotions (see Question 3)
- Adding demographic control variables (see Question 3)
- Analyzing *Significant other* as a separate category (in addition to close peers [minus significant others], family, and weak ties)
- Including interactions with partners from multiple categories (see Question 6)
- Examining the effects of different forms of CMC (see “Preregistration.pdf”)

Finally. For record keeping purposes, please tell us the type of study you are pre-registering.

Survey/Observational study

References

- Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus User's Guide*. Eighth Edition. Los Angeles, CA: Muthén & Muthén.
- Schimmack, U. (2009). Measuring wellbeing in the SOEP. *Schmollers Jahrbuch*, 129, 241-249.
- Soto, C. J., & John, O. P. (2017). The next Big Five Inventory (BFI-2): Developing and assessing a hierarchical model with 15 facets to enhance bandwidth, fidelity, and predictive power. *Journal of Personality and Social Psychology*, 113(1), 117-143. <https://doi.org/10.1037/pspp0000096>