Full length article

Facebook friends, subjective well-being, social support, and personality

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ABSTRACT

Offline social capital in the form of interpersonal networks is known to be associated with subjective well-being (SWB). In two studies run in the US ($N = 153$) and Germany ($N = 187$), we initially investigated whether the size of an individual's Facebook social network was associated with SWB and perceived social support. Objectively measured Facebook network size was positively associated with several measures of both self- and informant rated SWB but not with perceived social support. More pertinent to the present research, we next investigated whether the observed associations between network size and SWB were, in fact, an artifact of personality — trait Extraversion in particular. Indeed, self- and informant-rated Extraversion was associated with both Facebook social network size and with self- and informant-rated SWB. Importantly, controlling for Extraversion rendered the associations between Facebook social network size and SWB weak and statistically insignificant. We discuss the importance of social relationships on Facebook for well-being, as well as the implications of our results for research on the relationship between SWB, social network size, and personality.

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1. Introduction

The scientific literature on happiness or subjective well-being (SWB) — people's affective and cognitive evaluations of their lives — has witnessed a remarkable growth in the last three decades (Diener, 2013). A key finding that has emerged from this literature has been that interpersonal relationships and social capital are strongly associated with SWB. Not only do ties to friends, family, neighbours, workplace ties, and civic engagement lead to SWB (Helliwell & Putnam, 2004), but the opposite may also be true — well-being may lead to better social relationships (e.g., Lyubomirsky, King, & Diener, 2005). The importance of social relationships for SWB can help understand the huge interest in Internet social networking sites (SNS), which have provided new tools for fostering pre-existing social ties and creating new ones. Although an initial batch of studies reported an association between Internet use and decline in social involvement as well as an increase in loneliness and depression (e.g., Kraut et al., 1998), fears of the Internet producing a generation of social isolates (e.g.,

Cornish, 2006) turned out to be unfounded (e.g., Kraut et al., 2002). By contrast, a large scale longitudinal study by Wang and Wellman (2010) showed that number of friends in America increased from 2002 to 2007, and that heavy users of internet had the most friends, both off-line and on-line. Wang and Wellman (2010) went on to suggest that the growing number of friends in America was linked to the proliferation, popularity, and penetration of SNSs.

The most popular SNS, Facebook, has around 1.4 billion monthly active users, of whom almost ninety percent use Facebook mobile products (Facebook Newsroom, 2014). It allows users to create a network of people with whom they wish to share profile information, photos, comments, status updates, news etc. Especially now that mobile phones have bridged the gap between off-line and on-line worlds (Nylander & Larshammer, 2012) it may make little sense to see these worlds as distinct in any meaningful way. Indeed, the evidence supporting the idea that off-line and on-line worlds have converged is mounting: those who are liked in real-life tend also to be liked on-line (Weisbuch, Ivcevic, & Ambady, 2009), those who use Facebook more often possess more social capital (Burke, Marlow, & Lento, 2010), Facebook profiles reflect actual personality, not self-idealization (Back et al., 2010), and Facebook behavior influences real-life behavior (Bond et al., 2012), to name only a few examples.

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Considering, on the one hand, the empirical evidence suggesting a strong association between social relationships and SWB, and, on the other hand, the extent to which social media has been incorporated into people's everyday lives, one would expect social relationships in social media to be strongly associated with SWB. Indeed, Lönnqvist and Itkonen (2014) reported on a positive association between number of Facebook friends and ratings of happiness and life satisfaction (for similar results, see e.g., Kim & Lee, 2011; Valenzuela, Park, & Kee, 2009). However, Lönnqvist and Itkonen (2014) went on to show that number of Facebook friends was not associated with well-being when controlling for the personality trait Extraversion, and, based on this result, argued that Extraversion, at least in Finland, underlies both number of Facebook friends and well-being.

Building on the study by Lönnqvist and Itkonen (2014), the present research sought to more carefully investigate the associations between number of friends, SWB, and personality, Extraversion in particular, and to do so in two new cultural contexts, the US an Germany. Firstly, as acknowledged by Lönnqvist and Itkonen (2014), their measures of happiness and life satisfaction were far from ideal. Both of these constructs were measured with a single very short item, suggesting that responses are likely to have (a) been characterized by a non-trivial amount of random measurement error, and (b) been biased by response styles such as response acquiescence. Such factors would be expected to decrease the validity of the measures and thereby attenuate any associations between these measures and more objectively assessed variables (e.g., number of Facebook friends). Furthermore, single items cannot adequately capture the breadth of complex constructs such as SWB, commonly thought to exhibit a hierarchical structure comprising both cognitive and affective components, the latter of which can be further divided into positive and negative components. Although each of these components reflects people's evaluations of their lives, they show some degree of independence and should be assessed individually (e.g., Andrews & Whithey, 1976; Lucas, Diener, & Suh, 1996). For instance, high income improves cognitive evaluations of life but not emotional well-being (Kahneman & Deaton, 2010). It therefore seems plausible to assume that number of Facebook friends could, even when controlling for Extraversion, be associated with aspects of SWB not assessed by the two single-item measures of SWB administered by Lönnqvist and Itkonen (2014). In the present study, we employed a rigorously validated measure of overall SWB, as well as separate measures of the cognitive and affective components of SWB, the latter assessed with separate scales for positive and negative affect.

Secondly, Lönnqvist and Itkonen (2014) acknowledged that their results may have been confounded by method bias because both assessments of personality and assessments of SWB were based on self-ratings. This means that common method variance — due to e.g., respondents' response styles, consistency motives, or implicit theories — is likely to have strengthened the association between ratings of personality and ratings of SWB (for a review on method biases, see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In fact, common method variance could explain why the predictive power of objectively measured number of Facebook friends on self-ratings of SWB was undermined by self-ratings of personality. To remedy this, we included in Study 2, in addition to self-ratings of SWB and personality, also multiple informant-ratings of SWB and personality. This should eliminate common method variance (e.g., positivity bias) from the associations between personality and SWB, thereby allowing a more evenhanded comparison of personality and number of Facebook friends as predictors of SWB. Besides methodological issues, also supporting the use of informant-ratings to complement self-ratings are results suggesting that in some domains others may know us better than we know

ourselves (for a review, see Vazire & Carlson, 2011).

Thirdly, we further expanded upon the original study by employing a measure of social support — number of Facebook friends was not only expected to be associated with various aspects of SWB, but also with the experience of receiving social support. The results of a recent study on an off-line social network suggested that network characteristics, such as number of friends, are related to SWB primarily via the mediation of perceived social support (Zhu, Woo, Porter, & Brzezinski, 2013).

The fourth reason for conducting the present research stems from the current replicability crisis in psychology (Pashler & Wagenmakers, 2012). Already well before this crisis, and consistent with the general view that social psychologists' knowledge-claims should be understood as historical artifacts rather than timeless truths (for the origins of this perspective, see Gergen, 1973), effects obtained in one culture have for some time been known often not to replicate in other cultures (e.g., Amir & Sharon, 1987). Most pertinent to the present research, the determinants of well-being are known to vary across cultures (e.g.,Oishi, Diener, Lucas, & Suh, 1999; Sortheix & Lönnqvist, 2014). The study reported on by Lönnqvist and Itkonen (2014) was conducted in Finland and the participants were all Finnish. Similarly to the inhabitants of other Nordic welfare states, the Finns show exceptionally high levels of trust in public institutions (Oorschot, Arts, & Gelissen, 2006). Satisfaction with the public goods that such institutions provide is known to predict well-being (Oishi, Schimmack, & Diener, 2012). Having one's basic needs — the fulfillment of which is an essential determinant of well-being (Diener & Seligman, 2004; Helliwell & Putnam, 2004) — guaranteed by public institutions could make people less dependent on their social networks, undermining the importance of social ties for well-being. Indeed, a recurrent critique on the welfare state is that its social expenditures and comprehensive social programs 'crowd out' informal caring relations and social networks, as well as familial, communal, and occupational systems of self-help and reciprocity (e.g., Putnam, 2000; Wolfe, 1989). Therefore, we thought it important to assess the generalizability of the results reported on by Lönnqvist and Itkonen (2014) in more typical North-American and European settings — it seems possible that the associations between well-being and the size of one's social network would be stronger in countries with a less developed welfare system. The present research was run in the US (Study 1) and in Germany (Study 2).

To summarize, the present research sought to extend upon the research reported on by Lönnqvist and Itkonen (2014) by (a) employing a diverse set of rigorously validated SWB measures tapping into both cognitive and affective components of well-being, with the latter divided into separate measures of positive and negative affect, (b) eliminating the methodological biases and confounds involved in exclusively relying on self-report measures, (c) including a measure of social support as an additional outcome variable, and (d) assessing cross-cultural generalizability beyond a Nordic welfare context. Our hypotheses built on the results reported on by Lönnqvist and Itkonen (2014). First, we expected number of Facebook friends to be associated with all of our SWB measures (Hypothesis 1; the current literature did not allow for more specific hypotheses regarding which aspects of SWB could be expected to be most strongly connected to number of Facebook friends). Second, we expected number of Facebook friends to be positively associated with perceived social support (Hypothesis 2). Regarding this hypothesis, please note that we did not seek to test a mediation model in which number of friends would lead to heightened social support, which in turn would lead to higher well-being (as argued by Zhu et al., 2013); our reason for not testing mediation models was the growing consensus that mediation analyses with unmanipulated mediators cannot appropriately test

mediation effects (e.g., Bullock, Green, & Ha, 2010). Regarding personality, we expected the personality trait Extraversion to be associated with both number of Facebook friends (Hypotheses 3) and our measures of SWB and social support (Hypothesis 4). Most importantly, we expected that the associations between number of Facebook friends and well-being, as well as social support, be rendered insignificant when controlling for trait Extraversion (Hypothesis 5).

2. Study 1

2.1. Methods

2.1.1. Participants and procedure

One hundred and fifty three undergraduate students (61% female; M_{Age} = 20.2 years, SD = 3.2) at the University of Arizona participated in the study for partial course credit. Participants added a "Research profile" as a friend on Facebook, thereby allowing us to access their profile page, and completed online questionnaires before participating in an intervention study (see große Deters and Mehl (2013) for a description of the intervention study and see große Deters, Mehl, and Eid (2014) for other results based on this dataset).

2.1.2. Measures

2.1.2.1. Number of Facebook friends. The number of Facebook friends displayed on the profile page of the user was recorded by research assistants. The number of friends ranged from 13 to 1886, with a mean of 523.3 (SD = 371.6). Number of Facebook friends, being a count variable, has a floor of zero and no ceiling. Any distribution drawn from such a population would be expected to be positively skewed and thick-tailed. Indeed, number of Facebook friends revealed both skewness (1.23) and kurtosis (1.82). As this violates the normality and homoscedasticity assumptions of correlation and regression models, we normalized the distribution using a square-root transformation (Cohen, Cohen, West, & Aiken, 2003; Judd, McClelland, & Ryan, 2009). The square root transform — ranging from 3.61 to 43.43, with a mean of 21.44 (SD = 8.05) — showed much improved skewness (.26) and kurtosis (−.13) statistics. We therefore employed the square-root transformed variable in all analyses (we also tried normalizing the data using the natural-log transformation, but the skewness and kurtosis statistics clearly indicated that the square root transform was better).

2.1.2.2. Subjective Happiness Scale. Overall SWB was assessed with the four-item Subjective Happiness Scale (Lyubomirsky & Lepper, 1999). An example item is 'In general, I consider myself', to which participants responded on a seven-point scale with the anchors 'not a very happy person' and 'a very happy person'. Mean, standard deviations, alpha internal consistency reliabilities, and correlations between all measures are shown in Table 1.

2.1.2.3. Satisfaction with Life Scale. The cognitive aspects of SWB were assessed with the five-item Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). Participants indicated on a seven-point scale to what extent they agreed with items such as 'I am satisfied with my life'.

2.1.2.4. Positive and negative affect. The affective aspects of SWB were measured with the 20-item Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). Participants indicated on a five-point scale ranging from 'Very slightly or not at all' to 'Extremely' to what extent they had felt emotions such as 'Excited' (assessing positive affect) and 'Ashamed' (assessing negative affect) during the past week.

2.1.2.5. Interpersonal support evaluation list. We employed the 40-item Interpersonal Support Evaluation List (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). Participants indicated on a four-point scale ranging from 'Definitely false' to 'Definitely true' to what extent they agreed with statements such as 'There are several people that I trust to help solve my problems' and 'If I wanted to have lunch with someone, I could easily find someone to join me'.

2.1.2.6. Big five inventory. The Big Five Inventory (John & Srivastava, 1999) is a thoroughly validated 44-item questionnaire designed to measure the Big Five personality traits (Emotional Stability, Extraversion, Openness, Agreeableness, and Conscientiousness). In this measure, the stem 'I see myself as someone who … ' is followed by items such as 'is talkative' and 'does a thorough job'. The example items measure Extraversion and Conscientiousness, respectively. Agreement with the items was rated on a seven-point scale.

2.2. Results

We expected number of Facebook friends to be correlated with all of our measures of well-being as well as with social support. Supporting Hypothesis 1, number of Facebook friends was positively correlated with both overall SWB, as measured by the Subjective Happiness Scale, and with both cognitive and affective aspects of SWB, as measured by the Satisfaction with Life Scale and the Positive and Negative Affect Schedule, respectively (Table 1). However, contrary to our second hypothesis, number of Facebook friends was not significantly correlated with perceived social support. Consistent with our third hypothesis, number of friends was positively correlated with Big Five Extraversion, and, consistent with Hypotheses 4, Extraversion was also positively correlated with our measures of SWB and social support. Regression analyses, the results of which are presented in Table 2, in which our measures of SWB were regressed on age, sex, number of friends, and personality traits, revealed that number of friends could not contribute to the prediction of SWB when personality traits were controlled for. Supporting Hypothesis 5, partial correlations showed that controlling for Extraversion was sufficient to render the associations between number of Facebook friends and our measures of SWB small in size (all r < .09) and statistically insignificant (all p > .25).

Simmons, Nelson, and Simonsohn (2011), who explained how limited disclosure of the decisions made in the analysis process can endanger the integrity of science, recommended that the replicability of results obtained in analyses that include covariates always be tested in analyses without those covariates. Our main results were virtually identical in regression analyses that were run without our two covariates, age and gender. When entered alone, number of Facebook friends predicted happiness (β = .21, p = .01), life satisfaction (β = .29, p < .001), positive affect (β = .16, p = .04), and interpersonal support (β = .14, p = .08). However, when entered together with Extraversion, number of Facebook friends predicted these variables only weakly and statistically non-significantly.

2.3. Discussion

The results of Study 1 extended upon the results reported on by Lönnqvist and Itkonen (2014) by employing, in a new cultural context, a much broader and better set of SWB measures. Although number of Facebook friends was positively associated with many measures of SWB, these associations disappeared when controlling for personality traits. Such a pattern of results suggests that it is personality traits — Extraversion in particular — that underlie the associations between SWB and number of Facebook friends.

Table 1
Means, standard deviations, internal consistency reliabilities, and correlations between variables (study 1).

	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	20.16	3.23	–		.18	−.31	.04	−.15	.15	−.13	.07	.04	.03	.28	.02	.08
2. Sex	.39	.49	–			−.19	.13	−.07	.12	−.14	−.08	.26	−.03	.18	−.17	−.06
3. Friends	523	371	–				.21	.29	.16	.10	.14	.02	.42	−.09	.08	−.09
4. HA	5.27	1.13	.87					.73	.51	−.53	.60	.54	.45	.05	.40	.21
5. LS	4.94	1.26	.88						.39	−.45	.49	.50	.40	−.01	.25	.20
6. PA	3.56	.75	.87							−.26	.47	.37	.42	.30	.28	.30
7. NA	2.11	.72	.86								−.40	.60	−.20	−.13	−.21	−.28
8. IS	3.32	.42	.94									.44	.45	.18	.41	.40
9. ES	4.33	1.09	.82										−.28	−.12	−.36	−.24
10. EX	4.67	1.09	.85											.14	.13	.18
11. OE	4.82	.90	.80												.18	.23
12. AG	5.14	.88	.78													.30
13. CO	4.93	.84	.75													

Note. Correlations equal to or larger than $r = .16$ are statistically significant at $p = .05$. Woman was coded Sex = 0, Man was coded Sex = 1. Friends refers to number of Facebook friends. HA = Happiness, LS = Life satisfaction, PA = Positive affect, NA = Negative affect, IS = Interpersonal support, ES = Emotional Stability, EX = Extraversion, OE = Openness to Experience, AG = Agreeableness, CO = Conscientiousness.

Table 2
Standardized regression coefficients from regression analyses predicting self-reports of well-being (study 1; $N = 153$).

	HA	LS	PA	NA	IS
Age	.07	−.11	.10	−.07	.05
Sex	−.20**	−.12	.08	.04	−.10
Number of friends	.05	.14	.11	.12	.01
Emotional stability	.46***	.45***	.18*	−.57***	.26***
Extraversion	.28***	.21**	.26**	−.07	.31***
Openness to experience	−.05	−.05	.15*	−.01	.03
Agreeableness	.17*	.02	.12	.04	.19*
Conscientiousness	.00	.07	.14	−.13	.21**
R^2 (Adjusted R^2)	.47 (.45)	.39 (.36)	.34 (.30)	.40 (.37)	.43 (.40)

Note. *$p < .05$, **$p < .01$, ***$p < .001$. Woman was coded Sex = 0, Man was coded Sex = 1.

However, similarly to the research reported on by Lönnqvist and Itkonen (2014), the results of Study 1 may have been confounded by common method variance influencing our measures of SWB and our personality measure, all of which were assessed by means of self-ratings. This is likely to have artificially strengthened the associations between SWB and personality. To address this issue, we also employed multiple informant-ratings of SWB and personality in Study 2.

3. Study 2

3.1. Methods

3.1.1. Participants and procedure

The study was advertised via mailing lists of student organizations from universities all over Germany and a compensation of 20€ was offered (see große Deters et al., 2014 for other results based on this dataset). All in all 187 participants (79% female; $M_{Age} = 23.5$ years, $SD = 3.5$) completed all relevant online questionnaires and managed to obtain at least one set of informant-ratings. Additionally, these participants added our "Research Profile" as a friend on Facebook and employed privacy settings that allowed us to see their number of friends. The number of informant-ratings ranged from one to six, with 40, 57, 59, 26, 4, and 1 participant collecting 1, 2, 3, 4, 5, and 6 informant-ratings, respectively. In all, we thus had 461 informant-reports, most of which were ratings by friends (58.8%), but which also included ratings by parents (16.1%), romantic partners (11.7%), and siblings (9.1%), with very few ratings (4.3%) provided by other relatives, acquaintances, or other persons.

3.1.2. Measures

3.1.2.1. Number of Facebook friends.
The number of Facebook friends displayed on the profile page of the user was recorded by a research assistant. The number of friends ranged from 24 to 741, with a mean of 213.6 ($SD = 130.2$). As in Study 1, number of Facebook friends revealed considerable skewness (1.15) and kurtosis (1.44). To remedy this, we again normalized the distribution using a square-root transformation. The square root transform − ranging from 4.90 to 27.22, with a mean of 14.07 ($SD = 4.24$) − showed improved skewness (.38) and kurtosis (−.06) statistics and was used in all analyses.

3.1.2.2. Subjective Happiness Scale.
As in Study 1, overall SWB was assessed with the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999; for a comprehensive validation of the German language version that we employed, see Swami et al., 2009). However, this time the scale was also employed in peer rating format (for evidence regarding the validity of informant-ratings, see Lyubomirsky & Lepper, 1999). Means, standard deviations, alpha internal consistency reliabilities, and correlations between all measures are shown in Table 3.

3.1.2.3. Satisfaction with Life Scale.
The cognitive aspect of SWB was, as in Study 1, assessed with the Satisfaction with Life Scale (Diener et al., 1985; for validation of the German language version that we employed, see Schumacher, 2003). Besides self-ratings, we also collected informant-ratings (for evidence regarding the validity of informant-ratings, see Pavot, Diener, Colvin, & Sandvik, 1991).

3.1.2.4. Good mood.
The affective aspect of SWB was measured employing four items of the German language Multidimensional Mood Questionnaire (Steyer, Schwenkmezger, Notz, & Eid, 1997). After the initial stem 'Right now I feel' the participants indicated on a five-point scale whether they felt 'content', 'great', 'bad' and 'uncomfortable', with the last two items being reverse scored.

3.1.2.5. Social support questionnaire.
In German-speaking countries, the 14 item Social Support Questionnaire by Fydrich, Sommer, and Brähler (2007) is well accepted to assess general social support, conceptualized as perceived or anticipated support from one's social network. Participants indicated to what extent they agreed with items such as "I receive a lot of understanding and security from others' and 'If I'm very depressed, I know who I can turn to'.

3.1.2.6. Big Five Inventory.
For both self- and informant-ratings of

Table 3

Means, standard deviations, internal consistency reliabilities, and correlations between variables (study 2).

	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Age	23.51	3.52	—		-.06	-.23	-.02	-.12	-.16	.05	-.04	.06	.14	.14	.14	-.06	-.26	-.03	.06	.11	.01	.07
2. Sex	.21	.41	—			.11	.03	-.02	-.01	-.15	.33	-.10	-.01	-.12	-.21	.05	.01	.25	-.09	-.16	-.13	-.17
3. Friends	214	130	—				.16	.15	.08	.02	.19	.30	.07	.06	-.04	.22	.15	.28	.36	.00	.06	-.10
4. HA (SR)	5.06	1.12	.86					.66	.46	.50	.61	.43	.20	.26	.19	.52	.40	.36	.36	.04	.18	.01
5. LS (SR)	5.22	1.02	.85						.46	.49	.41	.26	.08	.13	.35	.41	.55	.30	.18	.02	.20	.16
6. GM (SR)	3.94	.75	.86							.34	.32	.28	.14	.09	.09	.13	.20	.14	.22	.04	.06	.03
7. SS (SR)	4.43	.51	.90								.15	.44	.21	.10	.18	.23	.23	.06	.27	.17	.12	.04
8. ES (SR)	3.07	.91	.79									.27	.08	.20	.02	.37	.24	.46	.19	-.06	.04	-.11
9. EX (SR)	3.61	.87	.84										.28	.15	.10	.29	.10	.14	.64	.15	.03	-.11
10. OE (SR)	3.88	.77	.78											.17	.17	.14	-.01	-.05	.22	.58	.15	.00
11. AG (SR)	3.02	.74	.59												.20	.19	.06	.09	.07	.05	.40	.09
12. CO (SR)	3.68	.67	.69													.15	.25	-.01	.01	.12	.16	.54
13. HAP (IR)	5.15	.85	.83														.61	.62	.47	.19	.33	.13
14. LS (IR)	5.13	.72	.84															.38	.16	.02	.21	.26
15. ES (IR)	3.30	.66	.74																.32	-.06	.21	.05
16. EX (IR)	3.61	.87	.84																	.28	.18	.04
17. OE (IR)	3.89	.60	.78																		.25	.20
18. AG (IR)	3.24	.63	.67																			.23
19. CO (IR)	3.90	.63	.76																			

Note. Correlations equal to or larger than $r = .15$ are statistically significant at $p = .05$. Woman was coded Sex = 0, Man was coded Sex = 1. Friends refers to number of Facebook friends. HA = Happiness, LS = Life satisfaction, GM = General mood, SS = social support, ES = Emotional Stability, EX = Extraversion, OE = Openness to Experience, AG = Agreeableness, CO = Conscientiousness. SR indicates self-ratings, whereas IR indicates informant-ratings.

personality, we employed a short form of the Big Five Inventory (John & Srivastava, 1999) that was employed in Study 1. The 21 best items from the BFI were selected in the development of this German language measure (Rammstedt & John, 2005). Participants responded using a five-point scale.

3.2. Results

Consistent with Hypothesis 1, number of Facebook friends was positively correlated with self-reports of both overall happiness and life satisfaction as well as with informant-ratings of these same constructs (see Table 3). However, contrary to Hypothesis 2, social support was, as in Study 1, not significantly associated with number of Facebook friends. Regarding Extraversion, in line with Hypothesis 3, the correlation between number of Facebook friends and Extraversion, as measured by both self- and informant-ratings, was positive and significant, as well as were the correlations between Extraversion and our measures of SWB and social support (consistent with Hypotheses 4). Indeed regression analyses predicting well-being revealed that once either self-or informant-reports of the Big Five personality traits were controlled for, number of Facebook friends could neither significantly predict self-ratings nor informant-ratings of well-being (Table 4).

We next turned to Hypothesis 5, according to which controlling only for trait Extraversion was expected to be sufficient to render the associations between number of Facebook friends and our measures of SWB insignificant. To avoid method effects due to a common rater, we investigated how controlling for self- (informant-) ratings of Extraversion affected the associations between number of Facebook friends and informant- (self-) ratings of SWB. Consistent with our expectations, controlling for informant-ratings of Extraversion rendered the associations between number of Facebook friends and self-rating of happiness and life satisfaction insignificant (both $r < .07$, both $p > .25$). Similarly, controlling for self-ratings of Extraversion rendered the associations between number of Facebook friends and informant-ratings of happiness and life satisfaction insignificant ($r = .06$ ($p > .25$) and $r = 12$ ($p = .12$), respectively).

Again based on the recommendation by Simmons et al. (2011) we ran the above analyses also without our two covariates, age and gender. Our results were highly similar to the regression analyses that were run without these covariates. When entered alone, number of Facebook friends predicted self-ratings and informant-ratings of happiness ($β = .15$ ($p = .04$) and $β = .15$ ($p = .04$), respectively) and life satisfaction ($β = .22$ ($p < .01$) and $β = .15$ ($p = .04$), respectively), but all of these associations decreased and became statistically non-significant when entered together with either self-rated or informant-rated Extraversion.

3.3. Discussion

The result of Study 2 revealed the familiar pattern in which number of Facebook friends was correlated with self-reports of happiness and life satisfaction. More importantly, the results also showed that number of Facebook friends was positively associated with multiple informant-ratings of happiness. These may be among the first results to reveal an association between number of Facebook friends and a non-self-report measure of well-being. However, number of Facebook friends was also associated with informant-ratings of personality, Extraversion in particular. Indeed, when entered into regression analyses together with self- or informant-rated personality traits, number of Facebook friends could not contribute to the prediction of well-being. Furthermore, even when the associations between Extraversion and well-being were not bolstered by common method variance originating from

Table 4
Standardized regression coefficients from regression analyses predicting well-being and social support (study 2; $N = 187$).

	Self-ratings								Informant-ratings			
	Happiness		Life satisfaction		Good mood		Social support		Happiness		Life satisfaction	
	SRP	IRP	SRP	IRP	SRP	IRP	SRP	IRP	SRP	IRP	SRP	IRP
Age	−.06	−.03	−.15*	−.12	−.20**	−.19*	−.03	.01	−.07	−.09	−.28***	−.27***
Sex	−.09	.00	−.08	−.06	−.07	−.01	−.10	−.11	−.01	−.01	−.02	−.04
Number of friends	−.03	−.03	.03	.04	−.09	−.07	−.12	−.07	.10	−.05	.06	−.00
Emotional stability	.55***	.25**	.39***	.24**	.29***	.09	.09	.02	.29***	.53***	.21**	.34***
Extraversion	.25***	.29***	.12	.08	.20*	.23**	.41***	.26**	.15	.27***	.03	.05
Openness to experience	.06	−.04	−.02	−.04	.09	−.00	.08	.07	.04	.11	−.05	−.02
Agreeableness	.08	.10	−.02	.10	.01	.00	−.02	.04	.09	.14*	−.00	.08
Conscientiousness	.11*	−.03	.34***	.12	.06	.02	.11	−.02	.12	.04	.30***	.24***
R^2	.49	.45	.33	.15	.19	.09	.24	.10	.22	.52	.21	.29
Adjusted R^2	.47	.21	.30	.11	.16	.05	.20	.06	.18	.50	.17	.25

Note. $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$. Woman was coded Sex = 0, Man was coded Sex = 1. SRP indicates that that model employed self-ratings of personality traits, whereas IRP indicates that the model employed peer ratings of personality traits.

the rater (i.e., when employing self-ratings of personality and informant-ratings of well-being, or vice versa), controlling for Extraversion did away with all of the associations between number of Facebook friends and well-being.

4. General discussion

Across two studies, we expected and found number of Facebook friends to be associated with both cognitive and affective assessments of SWB. One of the key findings of the present research was that number of Facebook friends was also correlated with multiple informant-ratings of SWB. Given the subjective nature of SWB, we refrain from claiming our informant-ratings as superior in comparison to self-ratings. However, considering that biases such as the general evaluative bias and self-enhancement have a much weaker effect on informant-ratings of SWB than on self-ratings (Kim, Schimmack, & Oishi, 2012; Wojcik & Ditto, 2014), the result that number of Facebook friends is also associated with other indicators of SWB than self-ratings may constitute an important complement to the literature on social relationships and SWB. But these results came with a caveat — the associations between number of Facebook friends and SWB were due to personality traits, Extraversion in particular, underlying both number of Facebook friends and SWB. That is, number of Facebook friends could not predict SWB over and above personality. Another rather surprising finding was that number of Facebook friends was not associated with our measures of perceived social support.

The initial studies on the negative implications of Internet use on SWB (e.g., Kraut et al., 1998) have more recently been followed by studies suggesting that specifically Facebook use may have detrimental effects on SWB. A highly publicized experience sampling study conducted by Kross et al. (2013) showed that Facebook use negatively influences both how people feel moment-to-moment and how satisfied they are with their lives. They suggested that their results may have been due to social comparison processes — people may unfavorably compare themselves and their real lives with the images that their friends portray on Facebook. Indeed, Mukesh, Mayo, and Goncalves (2014) reported on empirical evidence suggesting that keeping up with online friends reduces life satisfaction because of feelings of envy associated with the ostentatious information shared on SNSs. In light of this recent batch of studies highlighting the negative implications of Facebook use, our results indicating that number of Facebook friends is actually positively correlated with broad indicators of well-being may serve as a sobering reminder that Facebook friendships are *per se* not necessarily all bad. Importantly, after controlling for personality, while Facebook friends did not significantly positively

correlate with well-being, we also did not find any significant negative associations — a high number of Facebook friends is not necessarily indicative of maladjustment (cf. Buffardi & Campbell, 2008) or low social attractiveness (cf. Tong, Van Der Heide, Langwell, & Walther, 2008).

Despite the pervasive influence that social media has had on how people in Western societies interact with their friends, the question of whether our results would generalize to off-line friends can be raised. Maybe number of off-line friends and acquaintances would be associated with SWB even when controlling for personality traits such as Extraversion? However, as argued in the Introduction, off-line and on-line worlds have very much converged among young Western adults. Facebook is primarily used to get instant communication and connection with friends (Cheung, Chiu, & Lee, 2011; Pempek, Yermolayeva, & Calvert, 2009), and to maintain and strengthen relationships that have developed off-line, not to meet new people (Ellison, Steinfield, & Lampe, 2007). Other SNSs, such as Twitter, may be more anonymous and used for many other purposes than socializing, and we would not expect similarly generalizable results to emerge for other SNSs.

Based on the above research suggesting strong similarities between Facebook and off-line social networks, one could expect our results to generalize to off-line social networks. However, there is a vast literature suggesting that off-line social network size is associated with perceived social support (e.g., Connell & D'Augelli, 1990; Lin, Ye, & Ensel, 1999; Seeman & Berkman, 1988). Furthermore, building upon this research, Zhu et al. (2013) showed that the effect of social network size on SBW is primarily mediated by perceived social support. In the present research, we did not find an association between social network size and perceived social support. One explanation for this discrepancy could be that previous research has relied on subjective measures of network size — for instance, Zhu et al. (2013) employed a name-generation approach. Self-rating techniques such as the name-generation technique are highly susceptible to methodological artefacts (Marsden, 2005; Paik & Sanchagrin, 2013), and it could be that the previously reported on associations between social network size and perceived social support are a result of method variance. Another possibility is that only off-line social network size, not Facebook social network size, is associated with perceived social support. Future research should directly compare the implications of on-line and off-line networks for perceived social support.

One final limitation of doing research on Facebook friendships is that weak (e.g., ties between colleagues) and strong ties (e.g., kinship ties) cannot be differentiated. Considering the vast empirical evidence on the importance of social support for well-being, it would, in future research, be important to employ objective

indicators of social network size that, in contrast to our measure, would allow for investigating separately strong and weak ties. More generally, given the conflicting results between our research and what has been previously reported (e.g., Zhu et al., 2013) further investigation into the associations between formal social network characteristics and subjective experiences of social support is warranted.

As argued in the Introduction, there may be cross-cultural variation in the extent to which social networks size is important for SWB. Whereas Lönnqvist and Itkonen (2014) conducted their study in a Nordic welfare state, in which the importance of social networks has been argued to be 'crowded out' by strong public institutions and social programs (e.g., Putnam, 2000), the present results suggest that Facebook social network size cannot, even in more typical Western countries, such as Germany and the US, contribute to SWB beyond the impact of trait Extraversion. An important next step would be to run similar research in non-Western countries.

The present research allows for the following novel conclusions. First, in typical Western countries, number of Facebook friends is positively associated with self-ratings of both cognitive and affective and aspects of well-being. Second, these associations are not due to self-report biases or social desirability concerns, as they also emerge when well-being is assessed employing more objective informant ratings of well-being. Third, Extraversion is the 'third variable' that underlies the associations between number of Facebook friends and SWB — importantly, this result was obtained also employing informant-ratings of Extraversion and SWB. Similar results obtained in previous research that relied exclusively on self-report measures (Lönnqvist & Itkonen, 2014) were in risk of being methodological artifacts. On a more general level, the present results are consistent with results from genetic studies suggesting that SWB is to great extent determined by personality traits (Weiss, Bates, & Luciano, 2008).

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