Self-Esteem Reactions to Social Interactions: Evidence for Sociometer Mechanisms Across Days, People, and Nations

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People have a fundamental need to belong that motivates them to seek out social interactions with close others (Baumeister & Leary, 1995). Leary and Baumeister's (2000) sociometer theory (SMT) poses that people who succeed in satisfying this need have higher self-esteem (SE). This prediction was tested across three hierarchical levels: intraindividual, interindividual, and international. Indicators of social interaction quantity, quality, and the interaction between quality and quantity were collected for relationships with friends, family members, and romantic partners. On the intraindividual level, relationship quality and the interaction between quantity and quality emerged as significant predictors of daily fluctuations in SE. Cross-lagged analyses indicated that this association is at least partly due to the effect of social inclusion on changes in SE. On an interindividual level, people who generally reported higher quality relationships also had higher levels of trait SE. On an international level, countries whose inhabitants regularly interact with friends were characterized by higher nationwide SE levels than countries without such practices, even when happiness, individualism, gross domestic product, and neuroticism were controlled.

Keywords: self-esteem, social interaction, friendships, cross-cultural comparison, sociometer theory

Interpersonal ties with other people serve various important functions. They provide emotional, instrumental, and informational support and can be a source of satisfaction and fulfillment. In harsh environments featuring dangerous predators, food shortages, rugged terrain, and hostile weather circumstances, staying with one's group can even be a matter of life and death. Because such environments likely dominated during much of the evolutionary history of the human species, it would be expected that we evolved powerful adaptations to establish and maintain social bonds with others. According to Baumeister and Leary (1995), one of such adaptations consists of a universal human desire for interpersonal attachment. On the basis of a review of a broad array of theoretical rationale and empirical evidence, they concluded that this need is a fundamental human motive. According to the same authors (Leary & Baumeister, 2000), self-esteem (SE) is a crucial part of this adaptation: It

serves as a gauge or "sociometer" (p. 1) to monitor people's level of belongingness, or social inclusion.

Leary and Baumeister (2000) compared the mechanism of SE regulation with that of a fuel gauge that issues a warning signal when the level of fuel becomes critically scarce. In a similar vein, at low levels of social inclusion, "the sociometer evokes emotional distress as an alarm signal and motivates behaviors to gain, maintain, and restore relational appreciation" (p. 12). Accordingly, on days when people feel socially included, they should feel better about themselves than on days when they feel isolated from others. These fluctuations have been shown to occur around relatively stable baseline levels of SE, which differ among people (i.e., trait SE). According to Leary and Baumeister (2000), this baseline feeling is partly determined by past experiences of being rejected or included, and also by people's potential for social inclusion by means of their standing on socially desirable traits, such as physical attractiveness or intelligence (Anthony, Holmes, & Wood, 2007).

The empirical evidence is consistent with the main tenet of the sociometer theory (SMT): that changes in people's level of social inclusion strongly affect SE (for a review, see Leary, 2003). Some of this evidence is based on experimental manipulations of people's sense of social inclusion in the laboratory that have been shown to cause corresponding changes in SE (Leary, Haupt, Strausser, & Chokel, 1998). In addition, the association between social inclusion and SE has been shown in naturalistic settings, such as in romantic relationships (Murray, Griffin, Rose, & Bellavia, 2003). The current study extends this work by examining three possible moderators of the association between social inclu-

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sion and SE: relationship type, operationalization of social inclusion, and level of analysis.

RELATIONSHIP TYPE

A first possible moderator of the association between social inclusion and SE is relationship type. According to Baumeister and Leary (1995), people's need to belong is satisfied by regular interactions within relationships that are characterized by both stability and affective concerns, suggesting that the sociometer should be most active in stable, close relationships. However, much of the experimental research supporting SMT was conducted by manipulating acceptance or rejection by previously unknown strangers, suggesting that the sociometer is also involved in monitoring social inclusion in less close relationships (e.g., with acquaintances). In the current study, we addressed this issue by investigating people's reactions to social interactions with their closest family member and closest friend, as compared with less close family members and friends. In addition, we tested the association between social interactions and SE within romantic relationships. This is important, because it is presently unclear whether there is one unitary sociometer that indiscriminately monitors all social relationships or whether there is a collection of various, loosely interconnected, domain- and relationship-specific sociometers, each of which is attuned to somewhat different contexts (Kirkpatrick & Ellis, 2001).

There are some theoretical reasons to expect differences in sociometer effects among different types of relationships. *Kin relationships* are very important to people, which can be partly explained by the notion that family members are genetically related, so investments in their well-being are associated with fitness benefits (Neyer & Lang, 2003). On the other hand, it could be argued that because family relationships last for life and have strong biological underpinnings, their inclusion status does not need to be monitored so intensively. *Friendships* can be important for social and emotional support and for establishing and maintaining social coalitions (Hartup & Stevens, 1997). Because ties of friendship can be loosened or dissolved, it can be predicted that one's level of social inclusion in these relationships is associated with changes in SE, though there may be differences between closer and less close friendships. Finally, *romantic relationships* provide support and intimacy and form the basis of reproductive alliances, making them highly relevant from both an evolutionary and attachment perspective (Hazan & Shaver, 1987). In addition, romantic relationships are under a constant threat of romantic competitors, so it can be expected that they are closely monitored by a sociometer mechanism with links to SE.

OPERATIONALIZATIONS OF SOCIAL INCLUSION

In the current study, we looked at the association between SE and three different operationalizations of social inclusion. First of all, it is possible to take a *quantitative* approach and measure such differences in belongingness by instructing individuals to list their close social relationships and then rate the amount of time they spend in corresponding interactions. An advantage of such an approach is that it specifically focuses on interactions within relatively stable and close bonds instead of lumping together interactions with different groups of people, regardless of the type

of relationship in which they occur. In addition, a methodological advantage of this approach is that specific estimates of interaction quantity are likely to be less influenced by response biases (Buss & Craik, 1981).

A second way to operationalize social inclusion is by focusing on interaction *quality*. According to this logic, people should report more SE if they perceive their social interactions as close, warm, and supportive. Such perceptions may be regarded as a proxy for the subjective likelihood that an interaction partner would provide support in times of need. If these subjective assessments have any validity (e.g., because they are rooted in past experiences of altruism or reciprocity), maximizing interpersonal closeness would be a highly useful evolutionary strategy in pursuing survival and reproductive goals.

Finally, it is possible that interaction quantity and quality interact to produce significant associations with SE. According to this logic, what matters most would be to maximize interaction quantity in social exchanges that are perceived as warm and supportive and to minimize time spent in social exchanges that are perceived as cold and unsupportive. Conversely, if a person is unable to do this, SE can be expected to be low. For example, a person who spends a great deal of time in negative interactions with a spouse who has filed for a divorce would not be expected to show high levels of SE.[1]

To the best of our knowledge, no previous study has looked at the interactive effect of quantity and quality in predicting SE However, there have been a number of studies that have compared the effect of social interaction quantity and quality on psychological adjustment (of which SE is a facet). In a series of studies using the Rochester Interaction Record (RIR: Nezlek & Wheeler, 1984), Nezlek, Reis, and colleagues found positive associations between social interaction quality and indicators of adjustment, such as health (Reis, Wheeler, Kernis, Spiegel, & Nezlek, 1985), psychological well-being (Nezlek, Richardson, Green, & Schatten-Jones, 2002), reduced depressive affect (Nezlek, Hampton, & Shean, 2000), and relationship satisfaction (Emmers-Sommer, 2004). By comparison, these studies have found relatively inconsistent effects of social interaction quantity, with some investigators reporting 0 or even negative effects (Reis et al., 1985), whereas others reported positive effects (Emmers-Sommer, 2004; Nezlek et al., 2002). Part of this inconsistency could be explained by the types of relationships that are investigated. Consistent with Baumeister and Leary's (1995) emphasis on the frequency of interaction within close relationships, the latter studies found positive effects of interaction quantity within romantic relationships.

LEVELS OF ANALYSIS

Applying the mathematical theorem of ergodicity to the field of psychology, Molenaar (2004) showed that it is highly improbable that the structure of intraindividual variation can be generalized to the structure of interindividual variation and vice versa. Similarly, correlations between average national levels reflect effects found on the interindividual level only as long as they are not overridden by cultural or environmental differences among the nations that are of relevance for any of the two correlated variables. When corre-

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[1] We thank an anonymous reviewer for this suggestion.

lations at the national level are taken as substitutes for individual-level relationships, uncontrolled variables might lead to an ecological fallacy (i.e., aggregation bias; Robinson, 1950).

Applied to the association between social inclusion and SE, the nature of the construct of SE itself changes when conceptualized at the intraindividual, the interindividual, or the international level. Specifically, *state SE* refers to temporary fluctuations within a person (e.g. across days), *trait SE* to stable individual differences, and *nationwide SE* to differences in the average levels of countries. For example, an individual can have a high trait SE but still experience temporary drops in state SE following rejection by important others. Similarly, nations can generally have high nationwide SE, but individual differences among individual inhabitants may still persist due to differences in social inclusion. Given that finding a similar relationship at all three levels of aggregation is neither trivial on statistical nor on empirical grounds (see Triandis, 2000, for a similar argument regarding the determinants of subjective well-being), replicating the association between SE and social inclusion at every level would make an especially strong argument for the pervasiveness and fundamental nature of the sociometer effect.

DIRECTION OF CAUSALITY

In experimental research on SMT, it is relatively straightforward to manipulate either social inclusion (e.g., by excluding a participant from a social setting) or SE (e.g., by giving bogus performance feedback). For example, in a series of four experiments, Leary et al. (1998) exposed participants to imagined or real social rejection and found that this led to a decrease in SE This supports the claim that cues of social inclusion are causally associated with changes in the sociometer.

Of course, the causal effect of social inclusion on SE does not rule out a simultaneous effect flowing from SE to social inclusion. That is, it may be that people who feel better about themselves are able to seek out better or more frequent interactions. To the best of our knowledge, no laboratory studies have addressed this issue (e.g., by manipulating participants' SE and then studying the effect on social interactions; Baumeister, Campbell, Krueger, & Vohs, 2003).[2] In a naturalistic setting, however, Murray, Holmes, and Griffin (2000) found evidence for a dependency regulation model by which SE affects people's perceptions of their romantic partners' regard, which in turn predicts perceptions of relationship quality.

With a cross-lagged longitudinal design, insights about the causal relationship between two variables from a naturalistic data set may be gained through examining the effect of the initial level of one variable on changes in the other variable. In the current study, we used this logic to investigate the effect of social interactions on changes in SE and vice versa. We know of only one study on the relative strength of these different causal directions. Srivastava and Beer (2005) found that being liked by others in small-group interactions was associated with increases in SE but that SE was not associated with increases in being liked. We expected that this pattern would replicate to the current study.

To summarize, the current study tested the SMT claim that engaging in extensive and high-quality interactions with others is associated with high levels of SE. Although several previous studies have shown a positive association between social inclusion

and SE (Leary et al., 1998, Leary, Tambor, Terdal, & Downs, 1995), in the current study we looked at three possible moderators of this association. First of all, we looked at the effect of relationship type by investigating differences among family, friendship, and romantic relationships and between close and less-close relationships. Second, we used both quantitative and qualitative indicators of social inclusion, as well as their interaction, to predict SE. Third, we investigated the replicability of the effect of social interactions with close others on SE on three mathematically independent and psychologically distinct levels: intraindividual, interindividual, and international.

STUDY 1: INTRAINDIVIDUAL AND INTERINDIVIDUAL LEVELS

Study 1a: Intraindividual Level

We first analyzed the association between social interaction and SE on the intraindividual level. If the predictions of SMT hold on this level, fluctuations in people's level of social inclusion should be associated with fluctuations in their level of state SE: On days with frequent interactions with close others, SE should be higher than on days without such interactions. According to SMT, a decreasing level of state SE motivates people to repair or consolidate threatened bonds with important others. If these efforts are successful and the individual reaches acceptable levels of social inclusion, state SE should increase again (after a while, SE then likely regresses to some baseline level captured by trait SE, as we will discuss later). Because of this, Leary et al. (1995, p. 519) stated that "state self-esteem is of paramount importance" in SMT.

Given the apparent central role of state SE in SMT, most studies have targeted this variable in testing its predictions. The corresponding evidence can be roughly divided into two categories, using either experimental or naturalistic longitudinal designs. Regarding the first type of evidence, Leary and colleagues conducted a series of experiments in which participants either imagined or experienced rejection by others and found that this experience correlated strongly with changes in people's state SE (Leary et al., 1995; 1998), even in subjects who claim not to base their SE on other people's reactions (Leary et al., 2003).

Several studies have investigated the link between state SE and social inclusion in more naturalistic contexts. Emmers-Sommer (2004) tracked participants' assessments of communication quality and quantity within either romantic relationships or friendships and found that both indicators (aggregated across 1 week) independently predicted relationship satisfaction and intimacy. In contrast, using a multilevel approach to track people's reactions to perceived acceptance and rejection by their romantic partners across 21 days, Murray and colleagues (Murray et al., 2003) did not find a (lagged) influence on state SE. Finally, Srivastava and Beer (2005) studied students' reactions to evaluations by their peers with whom they attended a series of group meetings and found that state SE could be predicted by the favorability of these evaluations, but not vice versa.

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[2] As one anonymous reviewer pointed out, this is because it is virtually impossible to separate the experimental effect of lowered SE from the experiences of rejection and devaluation that are needed to induce it.

Table 1

Intercorrelations, Descriptives, and Reliabilities Between Social Interaction Indices and Self-Esteem

Variable	Intercorrelations									Descriptives[a]		
	1	2	3	4	5	6	7	8	9	Range	M	SD
1. Closest family member—quantity	.90	.12	.34**	.07	−.04	.18**	−.09	−.09	.04	0.00–15.96	1.61	2.62
2. Closest family member—quality		.87	.11	−.05	.34**	−.02	−.07	.38**	.27**	1.44–5.00	3.94	0.72
3. Other family members—quantity			.92	.03	.01	.14*	.13*	.07	.08	0.00–17.83	1.88	3.05
4. Closest friend—quantity				.76	.09	.21**	−.14*	−.05	−.03	0.00–6.89	0.94	1.17
5. Closest friend—quality					.78	.08	.05	.33**	.22**	2.25–5.00	3.95	0.58
6. Other friends—quantity						.78	−.02	.00	.17**	0.00–10.36	1.39	1.51
7. Partner quantity							.82	.20**	.03	0.17–17.11	6.17	4.13
8. Partner quality								.89	.30**	1.69–5.00	3.96	0.71
9. Trait SE (RSES)									.93	1.00–5.00	3.56	0.92

Note. Reliabilities on the diagonal. Indices of interaction quantity are displayed in hours. SE = self-esteem; RSES = Rosenberg Self-Esteem Scale (Rosenberg, 1965).
[a] Descriptives for Variables 1–8 refer to person-specific averages across diary days.
* $p < .05$. ** $p < .01$.

In Study 1a, we used a diary design to investigate the association between social inclusion and state SE, the level from which SMT predictions were originally derived. Given the results of previous studies, we expected daily fluctuations in SE to be consistently linked with perceptions of interaction quality, especially in romantic relationships. Because of the mixed evidence regarding interaction quantity, in contrast, no firm predictions were derived regarding main effects of this variable or its interaction with interaction quality.

Method

Sample

Participants took part in a German online diary study that focused on the determinants of individual daily well-being. Internet studies offer an efficient way to collect large samples, and data from well-designed studies have been shown to be quite comparable with those from more traditional paper-and-pencil studies (Gosling, Vazire, Srivastava, & John, 2004). Publicity for this study was generated through links on Web sites dedicated to psychological research as well as postings on online forums. Of the 521 participants at beginning of the study, 241 (46% of the initial sample) met the strict criteria for inclusion in the statistical analyses (see later section). Of these, 225 (93%) were women, with an average age of 29.86 years ($SD = 9.79$). Slightly less than 50% were university students or graduates (including students or graduates of the German Fachhochschule).

Instruments and Procedure

Before taking part in the diary study, participants were asked to identify both a friend and family member with whom they had the most contact on average. In addition, they were asked whether they were currently involved in a romantic relationship. To allow for an unbiased comparison of the effect of social interaction for the different relationship categories, we used in subsequent analyses only data of participants with a romantic partner, resulting in a sample of 280 participants.

Upon completing a pretest questionnaire, participants filled out daily questionnaires for as long as 25 days, including measures of social interaction quantity and quality and state SE. As an incentive for participation, feedback was provided in the form of intraindividual correlations between daily events and mood, which was calculated after a participant had submitted 25 daily responses. To ensure that diary reports were based on the entire day and to minimize the time elapsed between the end of the day and filling out the questionnaire, participants could access the questionnaire only between 9 p.m. and 4 a.m. Because at least two data points are needed to calculate the slope between social interaction and SE, 39 participants who contributed only 1 daily report were excluded from the study, bringing the final sample size to 241.[3] On average, these participants contributed 14.24 daily reports ($SD = 9.59$).

On the first page of the diary, participants rated interaction quantity (in hours and minutes) of interactions with their closest friend, family member, and romantic partner. Participants also rated the intensity of their total contacts with other friends, family members, and acquaintances of the same and opposite sex (see Table 1 for psychometric properties of the different indicators). Separate ratings for friend, family member, and partner interactions were given for written, phone, and face-to-face contacts. When no interaction took place, this variable was set to 0. Since the interaction quantity indices were skewed toward high values, we capped extreme values at a z score of |3|.

After ratings of contact frequency and intensity, state SE was assessed with Items 3, 6, 7, and 10 of the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), which were modified to measure states (adapted from Nezlek & Plesko, 2003). To align the scale format to other scales (not reported here), we changed the original 1–4 response scale format into a Likert scale, anchored by 1

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[3] Participants who dropped out of the study after a single day had a lower daily SE than those who did not, $F(1, 277) = 8.80$, $p < .01$, $d = 0.50$. Because dropouts did not differ from continuing participants with regard to their general SE level, the most likely interpretation for this finding is that filling out the first daily questionnaire on a particularly bad day led to a diminished motivation to continue the study.

(*strongly disagree*) and 5 (*strongly agree*). All four items (reverse coded in some cases) were averaged. Because this aggregate depended on a different number of days per individual, its reliability was obtained from the hierarchical linear modeling (HLM) output of the intercept-only model, with a value of .84.

If participants reported at least one contact with the close relationship partners specified in the pretest questionnaire, the corresponding interactions were evaluated with a German adaptation of the RIR (Nezlek & Wheeler, 1984). The SE and interaction quality measures were presented in randomized order. The following nine items were used: enjoyment, interest, intimacy, dominance, feeling important, calm, safe, wanted, and respected. Separate principal component factor analyses on the ratings for friends, family members, and partners indicated that all items except dominance loaded highly on a general factor, so these eight adjectives were aggregated into a composite scale of interaction quality, which had good internal consistency (αs > .90). To compare effect sizes across hierarchical levels, we standardized all variables before using them in the analyses.

Analysis Strategy

For both interaction quantity and quality, we specified a separate multilevel model with daily SE as the dependent variable, using the HLM software (Bryk & Raudenbush, 1992). All predictors were group mean centered to ensure that they would tap into within-person fluctuations in SE instead of between-person differences, which were the focus of Study 1b. All social inclusion effects (slopes) were allowed to vary randomly among participants. Gender was included as a covariate of the average SE level (intercept) and the Social Inclusion × SE slopes (dummy-coded 0 = *female*, 1 = *male*).

For the closest family member, closest friend, and romantic partner, both quantity and quality data were available. In these cases, we first used "simple" models, including *either* quantity *or*

quality (as well as gender and the interaction between social interaction and gender) as predictors. Subsequently, we used full interaction models, with interaction quality, quantity, and an interaction term as simultaneous predictors of SE. For other family members and friends, no interaction quality data were available, so we could only use simple models with interaction quantity as predictor.

Finally, we used cross-lagged longitudinal models. In one set of models, we predicted a participant's SE on a particular day by that person's SE level on the previous day (autoregressive path) and the previous day's interaction quantity/quality. Thereby, we modeled the effect of social interaction on intraindividual changes in SE. In addition, we performed a complementary set of models that predicted a person's level of social interaction on a particular day from his or her level of social interaction and SE on the previous day. This way, we could compare the relative strength of the effect of social interaction on SE and the effect of SE on social interaction.

Results

Associations Between Interaction Quantity and Quality

In line with the notion that people seek out pleasurable interactions, we found significant associations between interaction quantity and quality. Specifically, significant HLM coefficients of .09, .19, and .09 were found for family members, friends, and romantic partners, respectively (ps < .01). The higher association in the case of friends may indicate that people have more opportunity to regulate the time they spend with friends, as opposed to the time spent with family members and romantic partners.

Models

Simple models. As can be seen in Table 2, simple models produced a significant association between SE and social interac-

Table 2

Multilevel Regression Coefficients Indicating Concurrent Within-Person Associations Between Self-Esteem and Social Interaction Quantity, Quality, and Their Interaction

	Quantity			Quality			Interaction		
Variable	*b*	Quantity × Gender	*SD*	*b*	Quantity × Gender	*SD*	*b*	Interaction × Gender	*SD*
Closest family member									
Simple model	−0.01	.11**	.10	0.19**	.22	.25**			
Full interaction model	−0.07*	.10†	.11	0.19**	.21	.24**	0.08**	−.13†	.11*
Other family members simple model	−0.02	.10	.05*						
Closest friend									
Simple model	0.07**	−.09	.03	0.14**	−.06	.19**			
Full interaction model	0.04†	−.04	.02*	0.12**	−.01	.19**	0.03†	−.06	.02*
Other friends simple model	0.12**	.11†	.07						
Partner									
Simple model	0.04†	−.08	.15**	0.36**	−.13	.25**			
Interaction model	0.00	−.01	.14**	0.36**	−.16†	.26**	0.07**	−.04	.11**

Note. Gender was coded as 0 for women and 1 for men. Full interaction models tested the main effects of quantity, quality, and their interaction simultaneously (including interactions with gender). Simple models tested the main effects of quantity and quality separately (including interactions with gender). Main effects of gender ranged between .23 and .31 (*M* = .27, *p*s ≥ .11). To ensure comparability with the quality analyses, we based the quantity models for closest family members and friends on the subsample on which the quantity models for other family members and friends were tested. Testing these models on the full data set produced virtually identical results.

† *p* < .10.   * *p* < .05.   ** *p* < .01.

tion quality, with coefficients of .19, .14, and .36 for family members, friends, and romantic partners, respectively. All quality indicators showed significant random standard deviations (i.e., differences in slope among persons) and no interactions with gender. Interaction quantity was not associated with SE in the case of romantic partners. For closest and less close friends, simple models resulted in significant coefficients indicating a positive influence of interaction quantity with coefficients of .07 and .12, respectively ($ps < .01$). The only gender difference emerged for the association between SE and interaction quantity with family members, which was stronger for men than for women. Significant random effects were only found for relationships with other family members and romantic partners.

Full interaction models. Including interaction quantity, quality, and their interaction as simultaneous predictors of SE did not reduce the effect of interaction quality. By comparison, the initially significant effect of the quantity of interaction with closest friends was reduced to marginal significance, and in the case of closest family members, even a negative association between interaction quantity and SE emerged. The initially marginally significant effect of interaction quantity with romantic partners disappeared. For all three relationship categories, the interaction effect reached at least marginal significance, with coefficients of .08, .03, and .07 for family members, friends, and partners, respectively ($p < .10$). The sign of these coefficients indicates that the positive association between SE and interaction quality was augmented when frequent interaction occurred, whereas the negative effect of having low-quality interactions was somewhat buffered when little interaction took place. Finally, in all cases, the effect of the interaction term varied randomly among participants.

Cross-Lagged Effects

Table 3 shows the cross-lagged effects of social interaction on a particular day (t1) on changes in SE a day later (t2) and vice versa. As can be seen, no effects of interaction quantity on changes in SE emerged. By comparison, a marginally significant effect of interaction quality with one's closest friend on changes in SE was found. The effect of closest family member interaction quality on SE was similar in size but fell just short of marginal significance ($p = .12$). Finally, a significant effect of partner interaction quality on changes in SE was found. When one-tailed significance levels

were applied (which was appropriate given the directional nature of our hypotheses), all these effects were at least marginally significant ($ps \leq .06$). Finally, there was significant between-person variability in the effects of social interaction on changes in SE in all cases except social interaction quantity with one's closest friend.

In contrast, the paths flowing from SE to changes in social interaction quality and quantity were (with one exception) not even marginally statistically significant (even when tested one-tailed), irrespective of the relationship that was investigated or the way in which social interaction was operationalized. No statistically significant random standard deviations around these (0) effects were found when indices of interaction quantity were considered, but at least marginally significant variability emerged when indices of interaction quality were used as predictors. The only exception of this pattern was that for men: SE on one day was positively associated with interaction quality with one's closest friend on the subsequent day.

Discussion

In Study 1a, we tested the intraindividual association between social inclusion and daily fluctuations in state SE. Results indicated that daily perceptions of interaction quality were consistently linked to SE, with more closeness being associated with higher SE levels. The strong links between perceptions of interaction quality and daily SE fluctuations are consistent with Leary et al.'s (1995) contention that the intraindividual level is paramount to SMT. We find it interesting that this association was strongest for relationships with romantic partners. As stated in the introduction, such relationships are highly relevant from the standpoint of evolutionary and/or attachment theory but also are under continuous threat from romantic rivals and other relational issues. It should be noted, however, that there was a lot of random variation around this (on-average) positive association. In fact, the standard deviation even surpassed the corresponding slope in the case of family member and friendship relationships and came close to the slope value in the case of romantic relationships. This result indicates that there are some individuals whose SE is hardly dependent on subjective perceptions of interaction quality, whereas there are others whose SE is extremely dependent on these cues.

Table 3
Multilevel Regression Coefficients Indicating Cross-Lagged Effects of Social Interaction on Self-Esteem and Vice Versa

	Dependent variable: SE_{t2}					Dependent variable: INC_{t2}				
Variable	SE_{t1} (stability)	Gender	INC_{t1} (cross-lag)	$INC_{t1} \times$ Gender	INC_{t1} SD	INC_{t1} (stability)	Gender	SE_{t1} (cross-lag)	$SE_{t1} \times$ Gender	SE_{t1} SD
Closest family member quality	.25**	.28†	.05	.10	.11**	.34**	−.05	.01	.05	.19**
Closest family member quantity	.25**	.24†	−.01	.00	.06*	.40**	−.21**	−.02	.27†	.04
Closest friend quality	.23**	.25	.05†	−.01	.15*	.33**	−.05	.00	.17*	.13†
Closest friend quantity	.25**	.23	−.04	.05	.03	.23**	.17	−.04	.01	.05
Partner quality	.19**	.22	.06*	.02	.14**	.26**	.05	.01	.04	.13**
Partner quantity	.21**	.23	.00	−.03	.08*	.42**	.16	.02	−.05	.05

Note. Gender was coded as 0 for women and 1 for men. The qualifiers t1 and t2 refer to the time of measurement, with t2 occurring on the day following t1. SE = self-esteem; INC = social inclusion.
† $p < .10$.   * $p < .05$.   ** $p < .01$.

In contrast to the relatively strong effect of interaction quality, the effects of interaction quantity (or duration) were modest at best: When only quantitative indicators were used as predictors, spending more time with friends (both close and not so close) was associated with higher daily SE levels. In addition, the time spent with one's partner was marginally significantly related to SE. However, when perceptions of quality and the interaction between quantity and quality were controlled, the effect of interaction quantity vanished in the case of romantic relationships and was reduced to marginal significance in the case of closest friends. For family relationships, an initially nonsignificant association was even transformed into a significantly negative one after quality was controlled, indicating that spending a great deal of time with the family, regardless of the quality of the interaction, may not be associated with favorable outcomes. In contrast, spending time with less close friends was significantly associated with daily SE, with a (marginally significantly) greater effect for men. Although we could not plot out this effect against the effect of interaction quality perceptions (which were not available for less close relationships), the size of the coefficient suggests that the association would probably have survived as the only significantly positive predictor of daily SE that is independent of interaction quality.

Consistent with our hypothesis, the interaction between quantity and quality was statistically significant in the case of relationships with family members and romantic partners and marginally significant in the case of friendships. These interaction effects suggest that SE is maximized when a great deal of time is spent in high-quality interactions while the time spent in low-quality interactions is minimized. This makes intuitive sense, as spending lengthy periods of time in low-quality interactions with significant others likely makes people highly conscious of the instability of the corresponding relationship. It should be noted, however, that we found a significant amount of random variability around this effect, suggesting that this mechanism holds true for some people more than for others.

Finally, to the best of our knowledge, we are the first to study short-term cross-lagged effects between social inclusion and SE. This method sheds some light on the causal order of effects of initial levels of one variable on changes in the other (i.e., controlling for stability). According to SMT, there should be an effect from social inclusion to SE, whereas Murray et al. (2000) predicted that there should also be an effect from SE to perceptions of social inclusion. Consistent with SMT, small effects of social interaction quality on changes in SE were found. The strength of the cross-lagged paths (Table 3) did not approximate the strength of the concurrent associations (Table 2) for at least four reasons. First, cross-lagged analyses control for the timely stability of the dependent variable, which reduces the variance that can be explained by the independent variable. Second, confounding ("third") variables (e.g., fluctuations in mood) affecting the concurrent but not the cross-lagged associations between social inclusion and SE may explain why the former are stronger than the latter. Third, it is possible that the time lag that we analyzed in the current study (i.e., 1 day) was either too short or too long to adequately reflect the hypothesized sociometer processes (see also later discussion). Finally, small cross-lagged effects can give rise to relatively large concurrent effects if associations over time are systematic and cumulative.

In contrast, the reverse effects flowing from SE to interaction quality failed to reach statistical significance, at least in women (who constituted the bulk of our sample). From a SMT perspective, this lack of association is to be expected, even though the sociometer is hypothesized to be part of a feedback loop that should motivate people to improve their social inclusion status when it is low (Maner, DeWall, Baumeister, & Schaller, 2007). However, low SE on 1 day is not likely to have an immediately stimulating effect on social interaction quantity on the subsequent day because rejection by significant others leads to depressive affect, which inhibits subsequent social behaviors (Allen & Badcock, 2003). From an evolutionary functional perspective, this extinction of previous responses should facilitate a re-evaluation of one's actions and whole social situation, which (if successful) should eventually lead to actions that restore social inclusion. However, these efforts do not necessarily have to be directed toward the same individuals (Maner et al. 2007) and may only exert an effect after an extensive period of time. For these reasons, it is possible that low SE on 1 day will not have a facilitating effect on social interaction quality or quality with the same interaction partner on the next day.

Study 1b: Interindividual Level

Results from Study 1a suggest that state SE is indeed related to social inclusion by close others during a particular day, as predicted by SMT. This poses the question as to whether this variable is also related to people's trait SE. According to Leary et al. (1995), "Trait self-esteem may be conceptualized as the typical or average resting position of the 'indicator needle' of the person's sociometer. This position reflects the person's perception of his or her inclusionary status in the absence of explicit cues connoting inclusion or exclusion" (p. 527).

According to Leary and MacDonald (2003), trait SE functions as an indicator of people's relational value "in the long run" (p. 404). This long-term expectancy is hypothesized to be primarily determined by people's history of social inclusion and exclusion. Thus, if people have been repeatedly rejected by others over time, they will likely internalize these experiences and develop a self-view as being less worthy of acceptance. Leary and Baumeister (2000) suggested that people's inclusion potential is linked to traits like likeability, competence, attractiveness, and morality (see also Anthony et al., 2007). Trait SE may thus reflect a person's standing on these relatively stable characteristics (MacDonald, Saltzman, & Leary, 2003). Alternatively, however, trait SE may be a mere self-evaluative derivate of general life satisfaction, which has been shown to be strongly related to the personality trait of neuroticism (Heller, Watson, & Ilies, 2004). Consistent with this, strong associations between SE and neuroticism have been reported in the literature (Judge, Erez, Bono, & Thoresen, 2002). To rule out this explanation, in Study 1b we assessed the association between social inclusion and trait SE after controlling for neuroticism.

Empirical evidence is consistent with the idea that people's chronic level of social inclusion is positively associated with trait SE. For example, previous studies have shown links between SE and low levels of loneliness (Ouellet & Joshi, 1986) and high levels of social support (Brown, Bifulco, & Andrews, 1986), which are both indicators of social inclusion. Diener and Diener

(1995) sampled correlates of a single-item SE scale across 31 countries and found that this measure correlated with individuals' level of satisfaction with their friends ($r = .31$) and family members ($r = .28$) in the great majority of nations and in both sexes. In contrast, the correlation between SE and satisfaction with finances was less strong ($r = .19$).

Other recent investigations explicitly based on SMT have also confirmed its predictions on the level of interindividual differences. For example, Leary et al. (1995, Study 5) reported correlations higher than .50 between trait SE and a scale tapping into people's general sense of social inclusion. In addition, although the previously cited study by Murray et al. (2003) did not find an association between perceived acceptance or rejection and SE on an intraindividual level, they did report that people's chronic level of felt regard by their partners predicted the average level (intercept) of SE across 21 days. Against this background, a positive association between people's trait SE and their average level of social inclusion was expected on the interindividual level.

Method

Sample

The sample of Study 1b consisted of the same 241 participants as in Study 1a.

Instruments

To capture participants' level of trait SE, we used the original (trait version) RSES (Rosenberg, 1965), which consists of 10 items (5 reverse scored; sample item: "On the whole, I am satisfied with myself"). As in Study 1a, a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) was used. The alpha reliability of this measure was .93. Neuroticism was assessed with the Big Five Inventory (BFI; John & Srivastava, 1999), with an alpha of .88. Both measures were administered at the beginning of the survey (i.e., before the participants filled out the daily measures).

To assess interindividual differences in social interaction quantity and quantity, we aggregated the social inclusion indices of Study 1a across days. As we did with daily SE in Study 1a, we obtained the reliability of these indices from the HLM outputs of the intercept-only models calculated separately for each variable. The resulting values are depicted at the diagonal of Table 1, ranging between .76 and .92.

Results

Intercorrelations Between Social Interaction Variables

As can be seen in Table 1, social interaction quantity was uncorrelated with quality in the case of family member and friendship relationships. For partner relationships, in contrast, a significant correlation of .20 was found. There were various significantly positive correlations between relationship-specific quantity indices (e.g., between less close family members and less close friends), whereas one correlation was negative (between closest friend and romantic partner). Correlations between quality indices were significant in all cases, ranging between .33 and .38.

Univariate Associations Between Social Interaction and Trait Self-Esteem

Table 1 shows the bivariate correlations between the various social interaction indices and SE. As can be seen, there were consistent positive associations between SE and social interaction quality, which ranged between .22 and .30. By comparison, none of the associations between interaction quantity and SE was significant, with one important exception: A significant correlation of .17 was found between SE and interaction quantity with less close friends.

Full Interaction Models

Paralleling Study 1a, relationship-specific indices of quantity, quality, and their interaction were inserted in a multiple regression analysis predicting trait SE. Table 4 shows the corresponding results. As the table shows, interaction quality consistently emerged as the sole predictor of SE. In no case did indices of quantity or the interaction between quantity and quality contribute significantly to the prediction of trait SE. Also, the association between social interaction and SE was not moderated by gender. The significant association between social interaction quality and SE survived a statistical control for neuroticism in relationships with close family members, $\beta = .13$, $p = .03$, and romantic partners, $\beta = .19$, $p < .01$, but not with close friends, $\beta = .07$, $p = .24$.

Discussion

Results of Study 1b replicated those of Study 1a in that social interaction quality emerged as the strongest predictor of SE. This pattern of results is consistent with the SMT notion that trait SE is dependent on individuals' history of acceptance and rejection, which is reflected in the overall quality of their social relationships. For relationships with family members and romantic partners, this association was independent of neuroticism, which has been shown to be a stable temperamental characteristic that is closely related to SE (Judge et al., 2002). By comparison, indices of interaction quantity were not related to trait SE, except in the case of relationships with less close friends.

Overall, findings from Study 1 suggest a close similarity between the intra- and interindividual levels of analysis. The only exception to this general pattern was that the significant interactions between quantity and quality on the intraindividual level could not be replicated on the interindividual level. This is likely

Table 4

Standardized Regression Coefficients Indicating the Effect of Interaction Quantity, Quality, and Their Interaction on Self-Esteem

Variable	Quantity		Quality		Interaction	
	β	Gender	β	Gender	β	Gender
Closest family member	.00	0.04	.30**	−0.17	.02	0.04
Closest friend	−.06	0.00	.20**	1.07	−.04	0.01
Partner	−.02	−0.36	.29**	0.47	.01	0.32

Note. Gender was coded as 0 for women and 1 for men. Main effects of gender ranged between .13 and .40 and were not statistically significant.
** $p < .01$.

a result of differences in dynamics between the two levels. For example, on the day-to-day level (Study 1a), indices of quantity and quality likely refer to the same interaction, whereas this is not the case on the between-person level (Study 1b). We will discuss this issue more extensively in the General Discussion.

STUDY 2: INTERNATIONAL LEVEL

In our final study, we focused on the association between social interaction and SE across countries. Because SMT is a theory about individual reactions to cues of social inclusion, it does not address associations between social interaction and SE across different countries. However, one theoretical perspective from the related field of subjective well-being research predicts significant associations between social inclusion and SE on an international level as well. According to Veenhoven (1991), the hedonic component of happiness is partly dependent on the degree to which certain biologically innate needs, such as the need for food or security, are gratified. Because countries differ in the degree to which they satisfy their inhabitants' needs (e.g., because they differ in gross domestic products [GDP]), they also differ in terms of average happiness levels. This logic can be adopted for SMT, as Baumeister and Leary (1995) argued that the need to belong is a fundamental human motivation. Accordingly, if countries (or cultures) differ in the opportunities they provide to satisfy this need, these differences should be associated with national differences in average SE levels.

Indirect evidence regarding conceptually related variables is consistent with the prediction that the positive associations found on the intra- and interindividual levels may be replicated on the country level. In two meta-analyses, Twenge (2000) found that Americans' neuroticism and anxiety scores have increased by almost 1 full standard deviation in recent decades. When correlating this increase with a number of societal indicators, she found that decreases in social connectedness (e.g., increase in divorce rates and the percentage of people living alone) may be the driving factor. Because neuroticism and SE are closely connected constructs (Judge et al., 2002), the same logic may also apply to the association between social inclusion and SE across nations. Therefore, countries with a culture of frequent contacts with close others should also be the ones with high average SE levels.

As mentioned earlier, cross-national comparisons have also been made on a construct that is empirically related to SE: subjective well-being. For example, Diener, Diener, and Diener (1995) investigated predictors of well-being across countries and found that high income (GDP per capita) and individualism to be strong predictors of well-being. To check the robustness of the association between social interaction and SE, we controlled for the influence of these predictors in the current study. In addition, to investigate whether possible effects of social interaction are specific to SE, we also statistically controlled for the conceptually related constructs of subjective well-being and neuroticism.

In investigating the association between SE and social interaction, we focused in the current study on developed, democratically governed, and industrialized countries. We had several reasons for doing so. First of all, when analyzing responses to the RSES across different countries (in the same data set as the one used in the current study), Schmitt and Allik (2005) found that negatively worded items (which constitute 50% of the scale) are interpreted differently in developed versus developing nations, suggesting that cross-cultural comparisons using this scale in a heterogeneous sample are of limited value. In addition, by focusing on relatively affluent, democratic countries, we reduced the influence of extreme between-country differences in the provision in urgent needs (e.g., food and physical security) that may overshadow the sociometer mechanisms that were the focus of the present article.

Method

Sample

The Organization for Economic Cooperation and Development (OECD) is an international organization of industrialized countries that share a commitment to democratic government and the market economy. The organization provides a setting where governments can compare policy experiences, seek answers to common problems, and identify good practice and co-ordinate domestic and international policies. Its 30 member states are located in North America (Canada, Mexico, United States), Europe (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Luxemburg, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, and Turkey), Oceania (Australia and New Zealand), and East Asia (Japan and South Korea). In addition, the Mediterranean island of Malta officially applied for membership in 2005.

Instruments

International Sexuality Description Project. Average SE scores per country were largely taken from Schmitt and Allik (2005). They analyzed SE data from the International Sexuality Description Project (ISDP), a collaborative effort of over 100 social, behavioral, and biological scientists from 56 nations (Schmitt et al., 2003). Most of the country samples were composed of college students, though some included general members of the community. Further details about the sample and the recruitment procedure can be found in Schmitt et al. (2003). Average SE scores were available for 53 countries. SE was assessed with the RSES, using the original 1- to 4-response scale format. Schmitt and Allik (2005) have provided evidence that the factorial structure of this instrument is largely invariant across nations. Across the 24 OECD countries that were included in their survey, the average alpha reliability of the RSES was .85.

In total, all 24 of the 31 (prospective) OECD countries (except Denmark, Hungary, Iceland, Ireland, Luxemburg, Norway, and Sweden) participated in the ISDP. To avoid selection biases, we attempted to obtain average SE scores for the 7 missing countries from other sources, which succeeded in the cases of Hungary (Piko & Fitzpatrick, 2003; $N = 652$), Iceland (Gudjonsson & Sigurdsson, 2003; $N = 424$), Ireland (Hughes, 2003; $N = 59$), Norway (Wilkinson, 2004; $N = 419$),[4] and Sweden (Nygren, Randstrom, Lejonklou, & Lundman, 2004; $N = 142$).

World Values Survey. One social interaction quantity score per country was taken from the 1999–2004 wave of the World Values Survey (WVS) (Inglehart, 2005). The WVS is carried out

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by an international network of social scientists who have collected data on cultural values for more than 80 countries, with representative samples of at least 1,000 participants per country. For this purpose, the original English, German, or French questionnaires were adopted into various languages (verified through a back-translation procedure in 14 of 27 cases). The survey included an item asking participants to indicate the frequency of spending time with friends, using a 1–4 Likert scale (1 = *weekly*, 2 = *once or twice a month*, 3 = *only a few times a year*, 4 = *never*). We created national aggregates by computing the proportion of respondents in a particular country who reported a weekly contact frequency (results were almost identical when focusing on the proportion reporting a monthly contact frequency; the other two categories were chosen by only 16% of respondents so they were not a suitable focus of aggregation). There was also an item asking for the time spent with relatives. However, since this item was only assessed in 7 OECD countries, we could not use it in the subsequent analyses.

International Social Survey.   The International Social Survey (ISS) is an annual international program of surveys covering social science topics. The data for the current study were assessed during the 2001 data collection. The survey contains nationally representative information for the following 18 of 31 OECD countries: Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Italy, Japan, New Zealand, Norway, Poland, Spain, Switzerland, and the United States. In these countries, a total number of 21,791 people took part in the survey, with an average national sample size of 1,211 (range, 912–1,560). Questionnaires for nations where English is not the native language were systematically checked by group discussions or experts (but not back-translated; Klein & Harkness, 2003). Regarding interaction quantity with friends, relevant items were as follows: "How often do you see or visit the friend you feel closest to?" and "How often do you have any other contact with this friend besides visiting, either by telephone, letter, fax, or e-mail?" Response categories for the former question were 1 (*lives in the same household*), 2 (*daily*), 3 (*at least several times a week*), 4 (*at least once a week*), 5 (*at least once a month*), 6 (*several times a year*), 7 (*less often*), and 8 (*never*). Because the first category was only chosen by a minority of respondents (2.9%) and likely represents a qualitatively different form of friendship, corresponding responses were coded as missing. The item tapping into indirect contacts with closest friends did not include this response category; instead, it ranged from 1–7. The mean response for each item was taken as the score for each country.

Regarding interaction quality, relevant items were three checklists for which participants were asked to name the first person they would ask to help in the following situations: "You had the 'flu' and had to stay in bed for a few days and needed help around the house, with shopping, and so on," "You needed to borrow a large sum of money," and "You felt just a bit down or depressed, and you wanted to talk about it." Participants who listed a friend as the first person they would turn to received a score of 1 on these variables, whereas the others received a 0. These responses were aggregated across countries so that the resulting index reflects the likelihood that a participant in a certain country would first turn to a friend for support.

Handling Missing Data

In case of missing values, we followed the procedure applied by Lynn and Vanhanen (2002) and used the mean of OECD countries sharing a land border as a substitute (see Table 5, for details).

Computation of Scales

The WVS item on the frequency of visits to friends was significantly correlated with the ISS index that assessed the frequency of indirect contacts with closest friends ($r = .72$, $p < .01$). However, both items were uncorrelated with the ISS item that assessed the frequency of visits of closest friends ($|rs| < .30$, $ps > .16$). Accordingly, we aggregated the first two indices (after standardization and reverse coding the ISS variable) into a global index of friendship interaction quantity ($\alpha = .84$). Because the two surveys on which this aggregate is based showed different patterns of missing data, no country's average level was entirely based on imputed values.

Regarding the indices of friendship quality, the ISS item tapping into friendship support in case of the flu was significantly correlated with support in case of depression ($r = .63$, $p < .01$), but neither item was related to financial support by friends ($rs < -.10$, $ps > .24$). Accordingly, we standardized the first two indices and aggregated them into a global index of friendship support ($\alpha = .77$). Only the two global indices were used in the analyses reported.

Control Variables

Happiness.   Happiness data were drawn from the World Database of Happiness (WDH) compiled by Veenhoven (2007). Country averages from this database may be based on multiple surveys, with an average number of 3.7 studies for the OECD countries included in the current study (range, 1–14).

Neuroticism.   Neuroticism data were drawn from the ISDP and were available for the same 24 countries for which primary SE data was collected (Schmitt, Allik, McCrae, & Benet-Martínez, 2007). Neuroticism was assessed with the corresponding scale of the BFI (John & Srivastava, 1999); the average alpha across all participating ISDP nations was of .79.

Individualism.   Individualism data for 29 of the 31 analyzed countries were taken from Hofstede's classic study of cultural values among IBM affiliates (Hofstede, 2006). It should be noted, however, that this variable was somewhat skewed, with relatively few countries having low individualism scores (see Table 5).

GRP.   GDP data for all 31 analyzed countries in 2005 were taken from the *CIA's World Factbook* (Central Intelligence Agency, 2006).

Results

Descriptive Statistics and Intercorrelations

Table 5 lists each country's mean value for each of the constructs that were assessed in the current study. The first seven columns of Table 6 display the correlations between the independent variables of the current study. As can be seen, there was a significantly positive correlation between interaction quality and quantity, $r = .58$, $p < .01$. Interaction quantity was also positively

Table 5

National Averages of Self-Esteem, Social Interaction Quantity and Quality, and Control Variables of 31 Countries in the Organization for Economic Cooperation and Development

Country name	Self-esteem	p weekly visits to friends	Indirect contacts with closest friend	Friendship interaction quantity	p calling a friend to help with chores	p calling a friend to help when depressed	Friendship interaction quality (support)	Happiness	Neuroticism	Individualism	Gross domestic product (per capita)
Australia	31.07	—	3.34	−0.15	.17	.44	0.30	7.70	50.82	90	32,000
Austria	31.78	.55	3.03	0.34	.17	.37	−0.22	8.00	49.69	55	32,900
Belgium	29.66	.50	3.41[a]	−0.39	.18[a]	.40[a]	0.11[a]	7.30	53.60	75	31,900
Canada	30.22	.64	3.39	0.16	.14	.40	−0.32	7.60	50.58	80	32,900
Czech Republic	28.47	.46	3.49	−0.66	.14	.39	−0.40	6.40	51.02	58	18,100
Denmark	31.47[a]	.60	3.09	0.45	.17	.44	0.30	8.20	49.07[a]	74	33,400
Finland	31.76	.63	3.08	0.57	.15	.38	−0.37	7.70	47.84	63	30,600
France	29.86	.57	3.53	−0.30	.20	.42	0.48	6.50	52.29	71	30,000
Germany	31.73	.46	3.06	−0.04	.20	.48	0.93	7.20	50.29	67	29,800
Great Britain	30.55	.75	3.07	1.04	.20	.46	0.78	7.10	51.39	89	30,900
Greece	31.29	.75	—	1.45	—	—	—	6.40	53.19	35	22,800
Hungary	26.92[b]	.35	4.29	−2.22	.09	.29	−1.69	5.60	50.63[a]	80	16,100
Iceland	32.80[b]	.62	—	0.48	—	—	—	7.80	—	—	34,900
Ireland	32.42[b]	.71	3.07[a]	0.89	.20[a]	.46[a]	0.78[a]	7.60	51.39[a]	70	34,100
Italy	30.56	.62	2.69	1.10	.13	.55	0.69	6.90	51.66	76	28,400
Japan	25.50	.26	3.60	−1.57	.07	.47	−0.56	6.20	57.87	46	30,700
Korea	29.17	.41	—	−1.11	—	—	—	5.80	53.99	18	20,400
Luxembourg	30.42[a]	.65	3.41[a]	0.17	.18[a]	.40[a]	0.11[a]	7.60	52.06[a]	71	55,600
Malta	29.53	.42	—	−1.03	—	—	—	7.50	52.35	—	19,000
Mexico[c]	32.04	.32	—	−1.78	—	—	—	7.60	48.00	30	10,100
Netherlands	31.60	.65	3.06[a]	0.68	.20[a]	.48[a]	0.93[a]	7.50	48.61	80	30,600
New Zealand	30.24	—	3.32	−0.10	.21	.47	0.96	7.20	49.59	79	24,200
Norway	29.80[b]	.67[a]	3.08	0.72	.17	.44	0.30	7.60	47.84[a]	69	42,400
Poland	30.34	.35	3.85	−1.59	.09	.30	−1.62	5.90	51.80	60	12,700
Portugal	31.30	.62	3.06[a]	0.56	.09[a]	.33[a]	−1.39[a]	6.00	50.21	27	18,600
Slovakia	28.94	.45	3.88[a]	−1.26	.11[a]	.33[a]	−1.18[a]	5.50	51.57	63	15,800
Spain	31.52	.62	3.06	0.56	.09	.33	−1.39	6.90	54.03	51	25,200
Sweden	31.20[b]	.67	3.08[a]	0.72	.16[a]	.41[a]	−0.03[a]	7.70	47.84[a]	71	29,800
Switzerland	29.16	.55[a]	3.24	0.04	.21	.50	1.19	8.10	48.72	68	35,300
Turkey	32.14	.62	—	0.48	—	—	—	5.20	49.88	37	7,900
United States	32.21	.68	2.99	0.89	.23	.49	1.33	7.40	50.00	0.91	42,000
M^d	30.44	.55	3.24	−0.03	.16	.43	0.17	7.02	51.19	63.59	27,713
SD^d	1.53	.14	0.29	0.95	.05	.07	0.90	0.84	2.11	19.32	10,120

Note. Per capita gross domestic product was reported in dollars of purchasing power parity (standardized international dollar price weights). [a]Information from neighboring countries was used to estimate this value. [b]Information from secondary publications was used to supplement this value. [c]Due to their large sizes and disparate cultures, the United States mean was not used to impute Mexico's International Social Survey data. [d]Only countries with nonimputed values were used to estimate means and standard deviations.

associated with happiness and GDP and negatively associated with belonging to the group of four former communistic countries (Czech Republic, Hungary, Poland, Slovak Republic). Interaction quality was positively associated with happiness, individualism, and GDP and negatively associated with living in a formerly communistic country. Happiness was positively associated with individualism and GDP and negatively associated with neuroticism and living in a former communistic country. GDP was negatively associated with living in a former communist country. Finally, individualism was positively associated with GDP.

Prediction of Self-Esteem

Table 6 shows the bivariate correlations between countries' nationwide SE averages and interaction quantity, quality, and the various control variables. As can be seen, SE was strongly and significantly associated with interaction quantity, $r = .64$, $p < .01$, but only marginally significantly with interaction quality, $r = .36$, $p = .08$. When only the 24 countries with complete data were included in the analysis, the association with interaction quantity was slightly reduced to .54 but remains significant, $p < .01$. Figure 1 shows a scatter plot of the association between SE and friendship interaction quantity. As can be seen, most countries fall nicely on the regression line. Only Mexico and Japan, two countries that are relatively low in individualism (together with South Korea, Portugal, Greece, and Turkey), fall somewhat out of place; if these two countries are excluded, the correlation rises to .73.

To check how robust the association between friendship interaction quantity and SE was vis-à-vis the control variables, we included all variables in a multiple regression predicting SE. Results are displayed in Table 6. As can be seen, interaction quantity emerged as the sole unique predictor of SE, with a standardized coefficient that even surpassed the size of the biva-

Table 6

Bivariate and Multivariate Associations Between Self-Esteem and Social Interaction Quantity, Quality, and Control Variables

Variable	1	2	3	4	5	6	7	8	8 (regressed)
1. Friendship interaction quantity	—	.58**	.41*	.22	.49**	−.21	−.58**	.64**	.79**
2. Friendship interaction quality		—	.66**	.58**	.61**	−.31	−.60**	.36	−.26
3. Happiness			—	.47**	.66**	−.38*	−.55**	.42*	.18
4. Individualism				—	.53**	−.22	.04	.01	.06
5. GDP					—	.05	−.47**	.13	−.06
6. Neuroticism						—	.01	−.56**	−.24
7. Ex-communist							—	−.45**	.05
8. Self-esteem								—	—

Note. GDP = gross domestic product.
* $p < .05$. ** $p < .01$.

riate correlation, $\beta = .79$, $p < .01$. Finally, we tested an interaction model, including friendship interaction quantity, friendship interaction quality, and their interaction as predictors of SE. The corresponding beta for interaction quantity rose to .88, $p < .01$, whereas the betas for interaction quality and the interaction terms were nonsignificant, $\beta = -.14$, and .06, respectively, $p > .43$.

Discussion

The results of Study 2 showed that SE differences between democratic, industrialized countries were strongly associated with differences in the frequency of interaction with friends. In fact, squaring the bivariate correlation between interaction quantity and SE allowed us to calculate that social interaction explained no less than 41% of the variation in OECD countries' average SE level. By comparison, country averages of friendship quality (support) and the interaction between quantity and quality were not significantly associated with SE. This result differs from the findings obtained in Studies 1a and 1b, in which interaction quality was more strongly associated with SE than interaction quantity was. This interesting asymmetry will be discussed in more detail in the General Discussion.
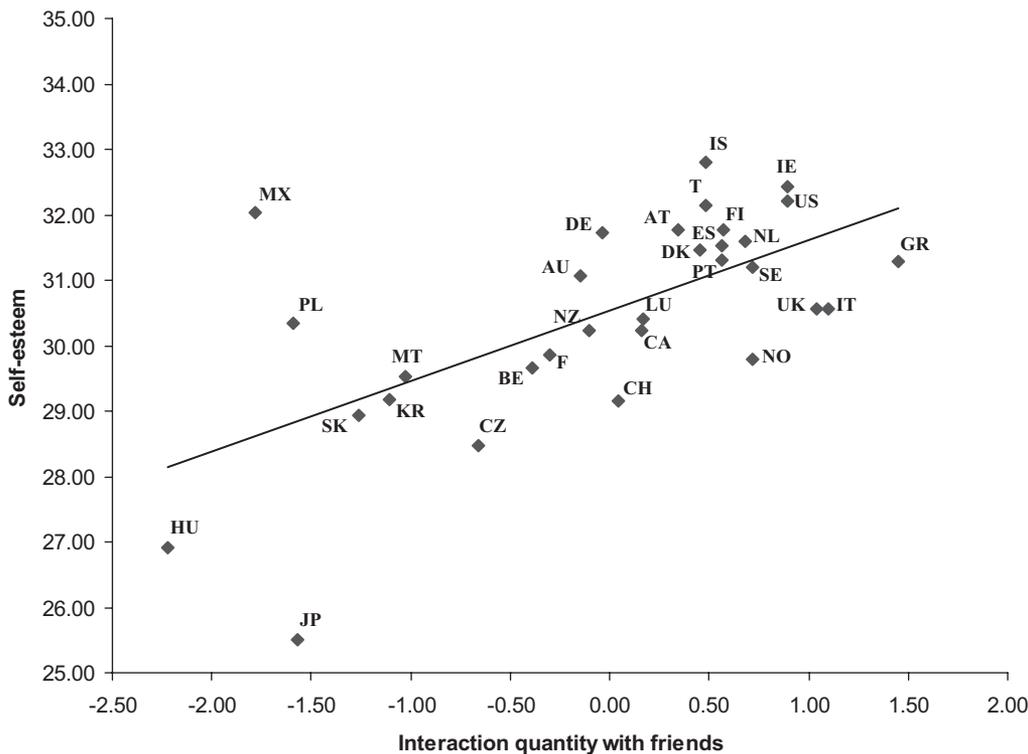

Figure 1. Scatter plot of the association between social interaction quantity with friends and self-esteem. Internet country codes were used to identify data points (AT = Austria, AU = Australia, BE = Belgium, CA = Canada, CH = Switzerland, CZ = Czech Republic, DE = Germany, DK = Denmark, ES = Spain, FI = Finland, FR = France, GR = Greece, HU = Hungary, IE = Ireland, IS = Iceland, IT = Italy, JP = Japan, KR = Korea, LU = Luxembourg, MT = Malta, MX = Mexico, NL = the Netherlands, NO = Norway, NZ = New Zealand, PL = Poland, PT = Portugal, SE = Sweden, SK = Slovakia, TR = Turkey, UK = Great Britain, US = United States).

One unique feature of Study 2 is that we could control for individualism and GDP, which previous studies have shown to be associated with the related construct of subjective well-being. In addition, we checked whether the association between social inclusion and SE differs between countries that formerly belonged to the communist Eastern European block and those that did not. Although these variables were significantly associated with both friendship quantity and quality, controlling for them left the association between social interaction quantity and SE intact. We also controlled for happiness and neuroticism, two variables conceptually related to SE. Again, this did not result in a reduction of the association between social interaction quantity and SE.

Given the exceptionally high correlation between friendship interaction quantity and SE, it seems important to reflect a moment on the content of this index. Recall that we formed a composite based on the average frequency of meeting with friends (from the WVS) and the frequency of engaging in indirect contacts with one's closest friend (from the ISS). Interpreted from a SMT perspective, frequent interactions with various friends, as well as telephoning and corresponding frequently with one's closest friend, appear to be general indices of social inclusion, though perhaps for different reasons: Whereas frequent interactions with many friends could indicate one's popularity and "social market value," frequent indirect contacts with one's closest friend could indicate a sense of mutual commitment even in the absence of direct contact (the exact opposite of "out of sight, out of mind"). In contrast, these items did not correlate with the frequency of meeting one's closest friend, which in turn did not correlate with SE, $r = .17$, $p = .42$. This could be due to the fact that nowadays most adults (who constituted the bulk of the nationally representative international surveys) may not have the time for frequently visiting their closest friend (e.g., because they may not live in the same area and are equally occupied with work and family duties).

GENERAL DISCUSSION

According to Baumeister and Leary (1995), people have a fundamental need to belong that motivates them to seek out social interactions with close others. In addition, Leary and Baumeister (2000) posited that people who succeed in satisfying this need should develop a higher level of SE. This prediction was strongly supported across three hierarchical levels: intraindividual, interindividual, and international. On an intraindividual level, days on which people reported higher quality interactions and spent more time in such interactions were also the days on which they had a more positive self-evaluation. On an interindividual level, people who generally felt close to important others were also the ones who had higher levels of trait SE. On an international level, countries whose inhabitants regularly interact with friends were characterized by higher nationwide SE levels than countries without such cultural practices.

The fact that results generally converge across different levels of analysis should be treated as strong evidence in support of the tenets of SMT. On the intraindividual level, the positive association between state SE and social interaction quality is consistent with the SMT prime focus on the sociometer as a monitor of fluctuations in people's state level of social belongingness. A novel feature of the current study was that we conducted a multi-level cross-lagged analysis to show that changes in social inclusion give rise to corresponding fluctuations in SE (consistent with SMT) but not the other way around (as would be predicted by Murray et al., 2000). On the interindividual level, we received support for the SMT claim that trait SE reflects people's general stable level of being accepted by significant others. Finally, the strong association between social inclusion and SE on the international level is consistent with the notion that the human species shares a fundamental need to belong in friendship relationships and that differences among countries in the satisfaction of this need are predictive of differences in the average SE of their inhabitants.

As an exception to this general cross-level consistency of results, interaction quality was more strongly related to SE than interaction quantity on the intra- and interindividual levels, whereas the reverse was found on the international level. Three methodological factors may have attenuated the association between social interaction quality and SE on the international level. First, people may compare themselves with peers of similar age and background when they assess their subjective level of relationship quality. Because these peers usually live in the same country as the participants, country means may underestimate national differences in the average quality of social ties (for a discussion of similar arguments in the domain of subjective well-being, see Triandis, 2000; Veenhoven, 1991). Second, we measured countries' average levels of perceived support in two specific situations. Because support in such situations may be strongly driven by cultural conventions, the latter assessments may have been less ecologically valid indices of interaction quality. Finally, differences between Study 1 and Study 2 in the assessment of interaction quality and quantity may partly account for the asymmetry in results. For example, interaction quality in Study 1 was somewhat confounded with quantity because participants reported on relationship partners with whom they have most contact (similar confounds have been pointed out by Reis et al., 1985), whereas this was not the case in Study 2. Future research is required to investigate the impact of these three methodological factors on the association between SE and social interaction quality in more detail.

Another interesting difference in the levels of analysis was that the interaction between quantity and quality was only a significant predictor of SE on the intraindividual level but not on the interindividual or the international level. This is likely due to the fact that measurements on the intraindividual level were more specific, so that it is likely that assessments of quantity and quality referred to the same social interactions. Under these circumstances, it may be no surprise that SE is highest when maximizing high-quality interactions and minimizing low-quality ones. On the interindividual and international levels, however, assessments of quantity and quality did not necessarily refer to the same interactions. For example, participants who reported one negative 15-hr interaction and 10 positive 5-min interactions during the course of the study would have had high average quantity as well as quality scores, but they would have spent much longer in low-quality interactions (900 min) than in a high-quality interactions (50 min). Future research should explore this explanation in more detail.

Further interesting findings of the present study emerged as a result of a systematic comparison of different relationship types. First of all, in Study 1, the quality of relationships with romantic

partners emerged as the strongest and most consistent predictor of SE. This is consistent with the evolutionarily significant, yet somewhat uncertain, nature of these relationships, which would imply the need for a corresponding, relationship-specific sociometer. Unfortunately, no data were available to test the association between romantic partner interactions and SE on the international level, though we suspect that such associations would emerge as strong and consistent predictors, especially among Western countries that emphasize the "romantic love" ideal of strong and mutual attraction and acceptance (conversely, the corresponding sociometer may be somewhat attenuated in non–Western societies that stress traditional values, such as family ties, financial possibilities, caste, and social class).

Differences between the effect of interaction quantity with closest versus less-close relationships could be tested on the intra- and interindividual levels of analysis. We found the same null effect for interactions with family members on both levels. Furthermore, the effect of interaction quantity with less-close friends was consistently found to be stronger than the effect of interaction quantity with one's closest friend. As stated previously, we suggest that frequent interactions with several friends may indicate one's popularity and social market value. By comparison, relationships with one's closest friend may not require frequent episodes of "seeing and being seen" because a sense of mutual commitment may be sufficiently communicated by frequent indirect contacts (e.g., short text messages, phone calls, so on)

While speculative, a possible implication of the latter finding would be that there are different sociometer systems (Kirkpatrick & Ellis, 2001): one monitoring the degree of social inclusion by one's closest relationship partners (e.g., best friends, committed romantic partners) and another monitoring the degree of inclusion by less-close partners (e.g., peripheral friends, uncommitted sexual partners). These two monitoring systems might be best conceptualized as compensatory parts of an overall security system (Hart, Shaver, & Goldenberg, 2005; Srivastava & Beer, 2005), motivated by the fundamental human need to belong (Baumeister & Leary, 1995). Thus, both the availability of close others and the quantity of social interactions with less-close acquaintances may be related to SE.

SE is associated with important variables such as depression (Crocker & Wolfe, 2001) and suicide (Baumeister, 1990). Our results suggest that interventions could most efficiently reduce the incidence of these problematic outcomes by targeting the quantity or quality of social interactions either through promoting satisfactory close relationships or encouraging individuals to spend more time interacting with a wide variety of friends. Our results on the international level suggest that the average SE in a country could be raised if its inhabitants could be provided with more leisure time to spend with their friends. That such a policy does not have to be associated with a "waste" of economic output is shown by countries such as the United States or Ireland, which combine a very high GDP per capita with a high percentage of people interacting frequently with their friends. Of course, we do not mean to imply that having a socially active life should be people's only goal in life, nor that there are no alternative routes to a high level of SE. We merely suggest social interaction opportunities as a promising intervention.

Limitations

In spite of a number of strengths, the current study was also characterized by a number of limitations. First of all, the association between SE and social interaction was tested cross sectionally on two levels, which does not allow us to draw any conclusions regarding causation. Fortunately, Study 1a allowed us to compare the cross-lagged associations from social inclusion with changes in SE and vice versa. Results were most consistent with a causal model flowing from perceptions of social interaction quality to changes in SE (see also Nezlek & Reis, 1999; Srivastava & Beer, 2005). Future research should try to replicate this result by obtaining longitudinal data on the interindividual and international levels as well.

Another limitation is the fact that the current studies partly relied on convenience samples. In Study 1, the sample was biased toward women, which may limit the generalizability of the corresponding conclusions. However, it may not be feasible to involve representative samples in time-intensive diary studies (Bolger, DeLongis, Kessler, & Schilling, 1989). Fortunately, this is less problematic than in traditional designs because diary designs focus on associations *within* individuals, using participants as their own controls. It should also be noted that previous naturalistic research did not find gender differences regarding the effect of social inclusion on SE (Srivastava & Beer, 2005). Although the social interaction data of Study 2 were drawn from nationally representative samples with balanced gender ratios, the SE and neuroticism data were drawn from convenience samples. Nevertheless, the fact that we found strong associations between SE and various theoretically related constructs (see Table 6) suggests that the current averages were both reliable and valid indicators of between-nation differences (for a similar argument from the field of subjective well-being, see Triandis, 2000).

Third, it should be noted that all findings were obtained in relatively affluent, democratic countries (i.e., Germany in Study 1, all OECD countries in Study 2), which of course limits generalizability of the current findings. Our argument in the current study article has been that the need for belongingness is a fundamental and universal human motive. Accordingly, it should be present in all cultures. However, as we noted above, it is quite possible that the specific criteria that people use to assess their level of social inclusion differ from country to country. In addition, serious deficiencies in the provision of basic needs (i.e., food, security) may modify the sociometer processes that were the focus of this article. More research is needed to assess the impact of these and other culture-related factors on the association between social interaction and SE.

Finally, the reader should keep in mind that the current operationalizations of social inclusion did not account for 100% of the variance in SE. How can we explain the additional variance? First, SE may not only be dependent on social inclusion by friends, family members, and romantic partners but also on a range of other individuals who were not assessed in the current study (e.g., colleagues). Second, measurement error may account for the less-than-perfect associations between social inclusion and SE. Accordingly, we found the largest effect size on the international level, which constitutes a higher level of aggregation than the SE scores of single persons or single days (Diener et al., 1995). Third, theorists have pointed to

various additional sources of SE other than social inclusion, such as satisfying the needs for competence and autonomy (Ryan & Deci, 2004).[5] The results of the current study merely suggest that subjective perceptions of social inclusion are an additional, evolved cue to feel good about oneself. Although this finding may also be construed as consistent with other accounts of SE (e.g., from a terror-management-theory perspective, SE may be associated with social interaction because like-minded people tend to validate each other's cultural worldview, leaving them with a more effective defense again SE-reducing mortality anxiety; Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004), we believe they are more easily reconciled with the tenets of SMT.

Conclusion

We have shown that spending time with close others has a robust effect on SE that can be found in day-to-day fluctuations of state SE, individual differences in trait SE, and between-country differences in nationwide SE. These results provide strong evidence for Leary et al.'s (1995) conceptualization of *SE* as an affective monitor of social inclusion. The finding that *SE* is affected by both the quantity of personal contact with less close friends *and* the subjective quality of interactions with close family members, friends, and romantic partners points to the simultaneous existence of two potentially complementary sociometer systems aimed at securing the fundamental human need to belong. Future studies should further explore this interpretation.

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[5] As pointed out by an anonymous reviewer, the effect of these additional sources on SE may be partly mediated by their positive effect on social inclusion.

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