A Cross-Cultural Study of Relationships Between Daily Social Interaction and the Five-Factor Model of Personality

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ABSTRACT Two studies, one in the United States ($N = 130$) and another in Germany ($N = 100$), examined relationships between daily social interaction and the traits of the Five-Factor Model. In both studies, student participants described their social interactions for 2 weeks using the Rochester Interaction Record. In both countries, Agreeableness and Conscientiousness were positively related to reactions to social interaction, whereas Neuroticism was unrelated to reactions to interactions. In the United States, Extraversion and Openness were positively related to reactions to interactions, whereas these factors were not related to reactions to interactions in Germany. In the United States, Extraversion was positively related to how socially active participants were, whereas none of the FFM traits was related to amount of social interaction in the German sample. In both countries, Extraversion was positively related to percent of interactions involving friends. The results highlight the importance of taking into account the sociocultural milieus within which personality unfolds.

The Five-Factor Model of personality (FFM) is meant to be a general model of personality traits, a constellation of characteristics that are presumed to be related on a somewhat consistent basis to a broad

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range of behaviors. Given this, these "building blocks of personality" should be related to people's daily social interactions. Social interaction is an important part of most people's lives, and according to virtually all trait theories, individual differences in personality should be related to individual differences in social interaction. The present study was designed to examine such relationships, to build upon and complement the existing research on this topic.

Social interaction is a broad term that encompasses a wide variety of interpersonal behaviors and social circumstances. Moreover, social interaction can be studied in various ways, ranging from the laboratory to the field, and various methods present different advantages. The present study focused on naturally occurring social interaction. We chose to study naturally occurring social interaction (rather than interaction as it occurred in the laboratory or a controlled field setting) for two reasons. First, naturally occurring social interaction seemed to be the type of broad behavior that should be related to the traits constituting the FFM. Second, we wanted to take into account individual differences in the types of interactions people had (with whom they interacted and what they did during their interactions) when examining relationships between the FFM and social interaction. It would not be possible to take such individual differences into account if the types of interactions people had were restricted, as they would be in a controlled study.

There is broad, although perhaps not perfect, agreement that the FFM is a universal model of personality. Although considerable attention has been paid to cross-cultural similarities in the factors and factorial structure of the FFM, to our knowledge, there has been no research on cross–cultural similarities (or differences) in relationships between the FFM and daily social interaction. Understanding such similarities is an important part of understanding how the factors composing the FFM are manifested in daily life. It is important to note that cross-cultural differences in relationships between the FFM and social interaction would not per se call into question the validity of the FFM; rather, such differences could be interpreted to mean that relationships between personality traits and behaviors vary cross-culturally.

In the present studies, participants in two countries, the United States and Germany, maintained a variant of the Rochester Interaction Record (RIR; Wheeler & Nezlek, 1977), a diary-style method that has been found to be a reliable and valid way of studying naturally occurring social interaction. They also completed measures of

the FFM (BFI-44; John & Srivastava, 1999). Relationships between the factors of the FFM and individual differences in social interaction were examined with a series of multilevel models. Previous research on relationships between social interaction and the FFM has examined relationships within one culture, and we felt that examining cross-cultural similarities and differences in such relationships was critical. Moreover, in terms of specifically comparing the United States and Germany, much previous research on the FFM and social interaction has been done in either of these countries, providing a useful context for evaluating the present results.

Characteristics of Interactions: Quality and Quantity

Individual differences in social interaction can be thought of in terms of two components, what we refer to as *quality* and *quantity*. For present purposes, quality consists of people's reactions to interactions—how they feel or think about what happened during the interaction—and we measured three dimensions of interaction: socioemotional (e.g., enjoyment), instrumental (e.g., influence), and feelings of acceptance (e.g., being liked by others). We thought these measures represented essential aspects of social interaction and would provide a good basis for examining relationships between the FFM and people's reactions to social interactions.

The second component of interaction we measured was *quantity* of interaction, which reflects how socially active are (e.g., number of interactions per day). Moreover, an emerging body of research suggests that quality and quantity of social interaction are relatively independent (Nezlek, 2000a). Given this independence, we present and discuss hypotheses separately for quality and quantity of interaction. Moreover, there is considerably more research about relationships between the FFM and quality of interaction than about relationships between the FFM and quantity of interaction. Nevertheless, we think that it is important to consider FFM-quality and FFM-quantity relationships jointly, and we discuss this in a separate section on possible mediational relationships. Finally, we present hypotheses about such relationships in general and hypotheses about German-U.S. differences.

FFM and Quality of Interaction

As might be expected from the definitions of the constructs, Agreeableness and Extraversion are the two FFM factors that have most

reliably been found to be related to reactions to social interaction. For example, on the BFI-44, Agreeableness is measured by items such as "helpful and unselfish" and "finds faults with others" (reversed). Extraversion is measured by items such as "generates enthusiasm" and "is shy, inhibited" (reversed). These descriptors suggest that individuals who are more agreeable and more extraverted will have more rewarding interactions, broadly defined, and such relationships have been confirmed by previous research.

In Feldman Barrett and Pietromonaco (1997), a diary study of U.S. undergraduates who used a variant of the RIR, a positive relationship between Extraversion and intimacy of interaction and a negative relationship between Extraversion and conflict in interaction were found. They also found that Agreeableness was negatively related to conflict in interaction. Asendorpf and Wilpers (1998) also examined relationships between the FFM and social interaction, and as part of their study of German undergraduates they used a variant of the RIR. They found a positive relationship between Agreeableness and conflict with opposite-sex peers.

Research using other methods also confirms such relationships. For example, in a questionnaire study, White, Hendrick, and Hendrick (2004) found that Extraversion and Agreeableness were positively related to relationship satisfaction and intimacy, somewhat more strongly for men than women. In a longitudinal study, Neyer and Asendorpf (2001) found that Extraversion and Agreeableness were positively related to closeness and importance of relationships. In a laboratory study of dyads of unacquainted females, Berry and Sherman Hansen (2000) found that Agreeableness and Extraversion were positively related to self- and observer-rated interaction quality.

Although much of the research on relationships between the FFM and social interaction has focused on Agreeableness and Extraversion, there is some research on the other factors. In terms of Neuroticism, the available research suggests that there are negative relationships between Neuroticism and various aspects of social interaction. For example, Lang, Lüdtke, and Asendorpf (2001) found that young adults' satisfaction with their social relationships was negatively related to Neuroticism. Feldman Barrett and Pietromonaco (1997) found a negative relationship between Neuroticism and self-esteem and control in interaction, although they found a positive relationship between Neuroticism and self-disclosure. White et al. (2004) found that Neuroticism was negatively associated with

satisfaction and intimacy in committed relationships, and similarly, Watson, Hubbard, and Wiese (2000) found that Neuroticism was negatively related to satisfaction in marital relationships.

Existing research also suggested that there would be positive relationships between Conscientiousness and quality of social interaction. For example, Kurtz and Sherker (2003) found a positive relationship between Conscientiousness and relationship quality in college roommates. Similarly, Watson et al. (2000) found Conscientiousness was positively related to satisfaction in dating couples, and Lang et al. (2001) found a positive relationship between Conscientiousness and young adults' satisfaction with their social relationships.

Finally, there is Openness, which has traditionally been considered in terms of intellectual activities more than the interpersonal domain. Nevertheless, McCrae (1996) suggested that "most of the research to date underscores the importance of Openness to shaping interpersonal interactions" (p. 331). In this initial article, McCrae argued that the quality of people's social contacts would be positively related to how similar they were in terms of Openness. Despite this, there are reasons to believe that Openness per se should be positively related to the quality of people's interaction, at least in the U.S. sample, as argued below.

Part of the factor of Openness is emotional openness to both one's own emotions and the emotions of others (Costa & McCrae, 1995). Being open also includes tolerance of differences and a willingness to learn new things, which can include understanding others and their thoughts and feelings. Openness may also include being able to see or understand the perspective of another—not necessarily agree with how others may think, but the ability to imagine how someone else might think even when such possibilities are different from one's own thoughts and feelings. Being open-minded means accepting others' ideas and values, and such Openness would seem to promote positive social relations.

A wide variety of studies supporting such relationships was discussed in McCrae and Sutin (2009). More specifically, McCrae and Sutin discussed research indicating that Openness is a trait that laypersons can observe in others, meaning that it has the potential to influence social interaction. They also discussed research showing that Openness per se (not similarity of Openness) is positively related to different aspects of social interaction such as conflict management and the provision of social support, and in more

intimate relationships such as dating and marriage relationships, Openness is positively related to relationship satisfaction per se.

In addition to research showing that the factor of Openness is positively related to the quality of social relationships and social interaction, there is some research suggesting that some facets of Openness are positively related to experiences in social interaction. For example, Kashdan, Rose, and Fincham (2004) proposed a measure of curiosity (a facet of Openness) that was related to individual differences in ways that would suggest that more curious people are better adjusted socially (e.g., curiosity was negatively related to social anxiety and positively related to well-being and positive affect). More specifically, Kashdan and Roberts (2006) found positive relationships between curiosity and the positive affect people experienced in social interactions. Admittedly, curiosity is only a facet of Openness, but the construct at the factor level includes the variance it shares with this facet.

FFM and Quantity of Interaction

The available research suggests that Extraversion is positively related to how socially active people are. In their RIR-based diary study, Asendorpf and Wilpers (1998) found a positive relationship between Extraversion and a measure of amount of contact. Similarly, Lang et al. (2001) found that Extraversion and Openness were positively related to the size of the social networks of young German adults. Within the present context, social activity is defined in terms of interactions per day and amount of time spent in interaction each day. Consistent with previous research, we expected that Extraversion would be positively related to social activity.

Individual Differences in Types of Interaction as a Possible Mediator of Relationships Between Personality and Reactions to Interactions

Although previous research is informative, not all studies that have examined relationships between the FFM and social interaction have taken into account individual differences in the types of interactions people have. For example, Feldman Barrett and Pietromonaco (1997) found that Extraversion was positively related to mean intimacy of interaction, and in their study, they examined relationships between the FFM and reactions to all interactions taken together.

Assume, for the moment, that extraverts tend to have more interactions with friends than introverts, and previous research has found that social interactions with friends tend to be more intimate than interactions with others (e.g., Nezlek, 1995). Such a combination leaves open the possibility that the relationship between Extraversion and intimacy of interaction (averaged across all interactions) is a result of differences in the relative frequency of interactions with friends. If extraverts have more interactions with friends than introverts, their mean intimacy score will be higher simply due to this difference. Such a possibility would not invalidate the relationship between Extraversion and intimacy for all interactions; it would simply add to our understanding of why this relationship existed and what it meant.

In the present studies, when evaluating relationships between the FFM and social interaction, we took two characteristics of interactions into account. The first characteristic was the activity that occurred during the interaction, something we refer to as the *nature* of an interaction (e.g., socializing or studying). The second characteristic was the type of relationship participants had with the people with whom they were interacting, something we refer to as *interaction partner* (e.g., acquaintances or romantic partners).

Cross-Cultural Differences in Relationships Between FFM Traits and Social Interaction

The previous discussion has not concerned possible differences between the United States and Germany in relationships between FFM traits and social interaction. In part, this is because available research and theory do not tend to emphasize such differences. The FFM is frequently discussed as a general, cross-culturally valid measure of personality (e.g., Paunonen, Haddock, Försterling, & Keinonen, 2003).

Moreover, in terms of research specifically on daily social interaction, all of the research we could find has been done in only a single country (much of it in Germany *or* the United States), making it difficult to discuss cross-cultural differences found in previous research. Nevertheless, there are various reasons to believe that some relationships between FFM traits and social interaction may differ between the United States and Germany.

Although discussions about broad cultural differences need to be conducted carefully, it appears that U.S. society is less well structured than German society (e.g., Staudinger, Fleeson, & Baltes,

1999). Such greater structuring is apparent at various levels, ranging from the administrative/governmental to the interpersonal. Interpersonally, the more structured nature of German society is apparent linguistically. In Germany, the form of address to unfamiliar adults is a formal pronoun, whereas a familiar pronoun is used to address friends. Although this distinction may not be as pronounced in some settings in Germany as it has been in the past, no such distinction exists in English.

In terms of cultural-level psychological dimensions, Hofstede (2001) reported that Germans tend to have stronger motives to avoid uncertainty than Americans (65 vs. 46), and Americans tend to be higher on individualism than Germans (91 vs. 67). In contrast, the two societies (Germany and the United States, respectively) are relatively similar in terms of power distance (35 vs. 40), masculinity (66 vs. 62), and long-term orientation (31 vs. 29). The combination of lower uncertainty avoidance and higher individualism suggests that the United States is a "looser" society than Germany (e.g., Triandis & Suh, 2002).

Descriptions of the development of friendships between Germans and Americans also highlight the differences between the two societies (e.g., Garies, 2000). Germans tend to form friendships less easily than Americans, although the friendships they have tend to be more intimate. In contrast, Americans are thought to have more, but more superficial friendships than Germans.

In terms of the FFM traits, we believed that such differences would be reflected in differences between the United States and Germany in relationships between social interaction and Openness. American society appears to be more open (looser) than German society. For Americans, to be open, to think less in terms of norms and conventions, and perhaps by extension, to establish relationships more easily and readily, is more normative. Assuming this, Americans who are high in Openness should be more successful in social interaction than Americans who are low in Openness. In contrast, for Germans, Openness is less salient or desirable with respect to social interactions. There is less tolerance of uncertainty and individualism is less pronounced. The norm is for relationships to develop slowly, and for people to be less open with each other. Although Openness may have some positive consequences among Germans, we expected relationships between Openness and quality of social interaction to be weaker among Germans than among Americans.

We also suspected that relationships between Extraversion and reactions to social interaction would differ across the two samples. Reflecting in part the same cultural differences discussed earlier in terms of Openness, we thought that Extraversion (being actively outgoing and socially focused) would be seen more positively in the United States than in Germany. If German society is more formal and structured than American society, then the spontaneity and general social activity that may characterize more extraverted people may be received better in a society in which social interaction is less bound by norms and conventions.

METHOD

Participants

The initial U.S. sample consisted of 134 undergraduate students who were recruited from introductory psychology classes at the College of William & Mary. The initial German sample consisted of 106 undergraduate students who were enrolled at Chemnitz University of Technology and received course credit for participating. We should note that the samples were collected as part of separate studies that were combined for this article because of the number of elements the two studies had in common.

FFM Measures

Participants in the U.S. study completed the English version of the BFI-44 (John & Srivastava, 1999), and participants in the German study completed a German version of the same measure (Lang et al., 2001). In both studies, participants responded to the question "I see myself as someone who . . ." using a 5-point scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*).

Procedure

The procedures for both studies were very similar and closely followed those introduced by Wheeler and Nezlek (1977). During an introductory session, participants were told that the study concerned patterns of social interaction and that they would use a Web-based structured questionnaire to describe their interactions. They were told to describe every social interaction they had that lasted 10 minutes or longer. An interaction was defined as any encounter with one or more other people in which the participants attended to one another and adjusted their behavior in response to one another. We provided examples to clarify what was an

interaction (e.g., a conversation) and what was not (e.g., sitting silently next to another person). Participants were told to describe only face-to-face interactions. Consistent with most previous research that has used the RIR, telephone and Internet conversations were excluded. Participants were told how to access the Web site that was used to record their data. All instructions were available on this Web site, and participants were encouraged to contact the researchers via email if they had any problems.[1]

For approximately 2 weeks, participants described their social interactions using a variant of the RIR (Wheeler & Nezlek, 1977). They reported the individuals with whom they interacted (using unique initials for each person) as well as the sex of each person, up to three different people. The social milieus of participants varied somewhat between the two studies, and this influenced how activities and personal relationships were categorized. Participants in the U.S. sample lived on campus in dormitories or nearby in small houses or apartments and did not live with or near family members. In contrast, for participants in the German sample, there were no dormitories, and participants lived in a medium-sized city, sometimes with family members.

In the U.S. study, activities were categorized as one of the following: socializing, meals, relaxation, work/study, date/party, sex/exchanging physical affection, or other. In the German study, activities were categorized as one of the following: going out, meals, relaxation, work/study, sex/exchanging physical affection, or other conversation. As can be seen from these categories, there was sufficient overlap between the two samples to provide a basis for clear comparisons. Similar to previous studies using the RIR, in both studies participants were told to choose the activity that best described the interaction if more than one activity occurred. Also similar to previous studies, participants were told to break longer interactions into sequential shorter interactions when the activity in which they were engaged changed meaningfully.

Participants also described the nature of the relationships they had with the people with whom they were interacting. In the U.S. sample, participants used the following categories: friends, acquaintances, romantic partners, roommates, and others, and in the German sample, slightly different categories were used: friends, acquaintances, romantic partners, family members, and others. In both studies, participants were told to use the description "friend" for friends regardless of other relationships they might have had with the person. For example, if a participant interacted with a coworker who was a close friend, the person was described as a friend.

1. The German forms and instructions were developed by the research team, which included individuals fluent in both languages. Materials were translated and back-translated to ensure accuracy.

Poststudy interviews with participants indicated that such overlap was relatively uncommon. Also, as discussed previously, it should also be noted that it is likely that the designation of a person as a friend probably varied between the United States and Germany, with the German definition entailing more selectivity than the U.S. definition.

Participants also described their reactions to their interactions (what we refer to collectively as quality of interaction), and the specific ratings varied somewhat across the two studies. In the U.S. study, participants described their interactions on seven dimensions: how enjoyable and intimate they found the interaction to be, how influential they felt, how much the other people present respected them, how much the other people present liked them, how freely they exchanged ideas with the other people, and how much they felt like an outsider. In the German study, participants described their interactions on nine dimensions. Four of these were the same as those used in the U.S. study: enjoyable, intimacy, and feeling respected and liked. The other five ratings concerned how dominant, calm, safe, interested, and important participants felt. All responses for both studies were made using 9-point scales for which 1 represented less and 9 represented more of the construct being rated. The specific wording of all scales is available from the authors.

During the introductory session, the response categories were discussed until participants understood the definitions, forms, and procedure. They were asked to complete an interaction record as soon as possible after each interaction, at least once a day. For the German study, special forms were made available to participants in case they had no access to the Internet for a whole day (e.g., over a weekend). One advantage of online data collection was the ability to know when data had been provided. In both studies, participants provided data an average of 1.2 times per day (German $SD = .26$; U.S. $SD = .46$). The data entry protocol allowed multiple interactions to be described each time a participant logged on to the Web site.

Descriptions of individual interactions were not accepted if they were provided past 10:00 a.m. the following morning. Individuals were deleted if they did not maintain the diary consistently (e.g., providing a day of data, followed by 4 days of no data, another day of data, followed by more missing days, and so forth). In the U.S. sample, 4 participants were eliminated from the analyses, and the final sample consisted of 130 participants who described a total of 8,402 interactions ($M = 65.1$, $SD = 31.0$) over an average of 15.9 days ($SD = 4.4$). There were 57 men and 73 women, and participants' ages ranged from 17 to 24, with a mean of 18.4 years ($SD = .90$). In the German sample, 6 participants were eliminated, and the final sample consisted of 100 participants who described 4,528 interactions ($M = 45.3$, $SD = 17.0$) over an average of

13.8 days ($SD = 1.38$). There were 86 women and 14 men, and participants' ages ranged from 18 to 36 years, with a mean of 22.4 years ($SD = 3.2$).

RESULTS

Overview of Analyses

We conducted two types of analyses. We examined measures of FFM traits using ordinary least squares techniques. The social interaction diary data were treated as hierarchical or nested data structures and were analyzed with a series of random coefficient models (HLM6; Raudenbush, Bryk, Cheong, & Congdon, 2000). Using multilevel random coefficient modeling to analyze social interaction diary data is discussed in Nezlek (2001, 2003). Due to various differences between the two studies, including the specific ratings made of interactions and the codes used to define activities and relationships, the social interaction diary data for each study were analyzed separately.

The HLM analyses focused on two aspects of social interaction, referred to in this article as quality and quantity. Analyses of the quality of interaction concerned ratings of interactions: how participants reacted to and felt about their contacts with others. Analyses of the quantity of interaction concerned how socially active participants were.

FFM Scores

Participants' responses to the BFI-44 were scored using standard protocols, and a summary of these responses is presented in Table 1. As can be seen from these data, the two samples were very similar in terms of the means and standard deviations of each of the measures. They differed meaningfully however, in terms of the correlations between the factors. In the German sample, the correlations between Neuroticism and Agreeableness, Extraversion, and Conscientiousness were higher than they were in the United States (Fisher's *r*-z test, $ps < .05$, .08, .08, respectively), and the correlations between Openness and Extraversion, Agreeableness, and Conscientiousness were also higher than they were in the United States ($ps < .05$, .08, .08, respectively). Such differences are consistent with correlations found in other German samples (e.g., Lang et al., 2001). These

Table 1
Descriptive Statistics and Correlations Between FFM Factors

U.S. Sample	*M*	*SD*	α	Agre	Cons	Neur	Open
Extraversion	3.44	.80	.86	− .12	− .06	− .09	.10
Agreeableness	3.79	.62	.80		.22*	− .15	− .11
Conscientiousness	3.53	.74	.87			− .04	.01
Neuroticism	2.96	.70	.77				.03
Openness	3.68	.65	.80				

German Sample	*M*	*SD*	α	Agre	Cons	Neur	Open
Extraversion	3.43	.81	.88	.01	.15	− .44**	.41**
Agreeableness	3.67	.43	.63		.21*	− .37**	.25*
Conscientiousness	3.43	.51	.75			− .25*	.28*
Neuroticism	3.20	.72	.80				− .22*
Openness	3.75	.49	.73				

*$p < .05$. **$p < .01$ or beyond. $p < .10$.

correlations between the factors in the German sample meant that all five factors needed to be included simultaneously in the analyses examining relationships between the factors and measures of social interaction. For the sake of comparability, all five factors were included in the analyses of the American data.

Quality of Interaction

In the analyses of quality of interaction, interactions were treated as nested within persons. Before examining relationships between reactions to social interaction and personality, each dependent measure was analyzed with an unconditional model. In these models, there was no predictor at either Level 1 (the interaction level) or Level 2 (the person level). Such analyses estimated the means and the variance at each level of analysis, and the results of these analyses are presented in Table 2. The models are below. There were i interactions nested within j persons. For each of j persons, a mean (β_{0j}) was estimated, and the variance of r_{ij} was the Level 1 (within-person or interaction level) variance, γ_{00} represented the mean of β_{0j}, and the

Table 2
Descriptive Statistics for Reactions to Interactions

U.S. Sample				German Sample			
Rating	Mean	Level 1 Variance	Level 2 Variance	Rating	Mean	Level 1 Variance	Level 2 Variance
Enjoyment	7.03	1.98	0.80	Pleasing	7.06	2.94	.55
Intimacy	5.17	3.21	3.27	Close	6.77	2.99	.58
Influence	5.81	2.68	1.78	Dominant	5.37	1.12	.32
Liked	7.05	1.78	0.93	Liked	7.64	1.50	.48
Respected	6.90	2.49	1.48	Respected	7.39	1.23	.79
				Safe	7.29	1.51	.80
				Relaxed	6.87	1.77	.96
				Interesting	7.08	1.46	.75
				Important	6.53	1.39	.92
Exchange	6.39	1.88	1.12				
Outsider	1.97	1.81	0.72				

Note. Level 1 is the within-person (interaction level) variance, and Level 2 is the between-person variance.

variance of υ_{0j} was the Level 2 (person level) variance.

$$y_{ij} = \beta_{0j} + r_{ij}.$$

$$\beta_{0j} = \gamma_{00} + \upsilon_{0j}.$$

These analyses indicated that there was ample variability at the person level to justify examining relationships between personality and reactions to interactions. The means for both samples suggested that on average, social interactions were positive in terms of the various reactions measured in each study. Given the inherent difficulties in creating perfectly identical measures across the two languages (even for scales that are labeled similarly in the tables), it is likely that there were some differences in how these scales were interpreted in each sample. The scale for which there was the largest difference between the two sample means was intimacy, defined as closeness within the German sample. Nonetheless, mean closeness in the German sample (6.77) is very similar to the mean reported by Nezlek, Imbrie, and Shean (1994) for their nondepressed American participants (6.7) who also rated closeness of interactions. More important, the results of Nezlek et al.

Table 3
FFM Factors and Sex as Predictors of Reactions to All Interactions: U.S. Study

Rating	Sex	Extr	Agre	Cons	Neur	Open
Enjoyment	.13[a]	.16*	.34**			.12[a]
Intimacy	.25[a]	.33*		.22		.56**
Influence	.17	.17	.19	.28*		.29**
Liked	.21**	.15[a]	.21*	.12[a]	−.17*	.22**
Exchange	.13	.24**	.35**	.21*		.26**
Respected	.23**	.13[a]	.28**	.22**		.25**
Outsider	−.20*					−.10

*$p < .05$. **$p < .01$ or beyond. [a]$p < .10$. Coefficients with an absolute value of less than .10 were not tabled.

(1994) suggested that closeness is a construct that is very similar to intimacy, albeit with a slight scale shift upwards.

The next set of analyses examined relationships between FFM factors and reactions to interactions. The Level 1 (interaction level) model was unconditional, and the Level 2 model contained a contrast-coded variable for sex (to control for any sex differences in mean ratings) and a term for each of the five factors of the FFM. The models for these analyses are below:

$$y_{ij} = \beta_{0j} + r_{ij}.$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Sex}) + \gamma_{02}(\text{A}) + \gamma_{03}(\text{C}) + \gamma_{04}(\text{E}) + \gamma_{05}(\text{N}) + \gamma_{06}(\text{O}) + \upsilon_{0j}$$

The results of these analyses for the American sample are presented in Table 3, and the results for the German sample are presented in Table 4. The FFM measures were standardized prior to analysis, so the coefficients presented in these tables represent the estimated change in the mean for a person for a 1 *SD* increase in an FFM measure.

For the American sample, the general pattern was that interaction outcomes were positively related to Agreeableness, Conscientiousness, Extraversion, and Openness, albeit with some differences in the strength and number of relationships across these measures. Only one outcome (feeling liked) was significantly (negatively) related to Neuroticism. A somewhat different pattern emerged in the German sample. For the Germans, interaction outcomes were positively

Table 4
FFM Factors and Sex as Predictors of Reactions to All Interactions: German Study

Rating	Sex	Extr	Agre	Cons	Neur	Open
Pleasing	.27*		.17*	.22**		
Close	.31*		−.15[a]	.25**		
Dominant	−.16			.11*		
Liked	.31**		.27**	.11		
Respected	.25**		.25**	.20**		.12
Safe	.12		.18*	.26**	−.16[a]	
Relaxed			.17[a]	.36**	−.18[a]	
Interesting	.21*		.20*	.25**		.15
Important	.43**	.14		.11		.17[a]

*$p < .05$. **$p < .01$ or beyond. [a]$p < .10$. Coefficients with an absolute value of less than .10 were not tabled.

related to Agreeableness and Conscientiousness, and there were no significant relationships between interaction outcomes and Extraversion, Neuroticism, or Openness. It is important to note that follow-up tests that examined interactions between participant sex and significant predictors (in both samples) did not find that the main effects reported here were qualified by sex.

Often when collecting multiple measures, there are questions about the independence of such measures, particularly when similar patterns of results are found for different measures. In such cases, it is reasonable to try to determine the extent to which results for different measures reflect the operation of different processes and the extent to which they reflect the operation of a single underlying process. Across both samples, different reactions were positively related at the within-person level (all $ps < .05$). Greater enjoyment was associated with greater intimacy, greater influence was associated with greater feelings of being liked, and so forth; however, such simple covariation does not address the extent to which relationships between the FFM and one measure overlap with the relationships between the FFM and another measure.

Addressing this issue exhaustively would require examining relationships between the FFM and each reaction, controlling for every other reaction, a procedure that would require an unwieldy number of analyses. Nevertheless, we felt that enjoyment in the U.S. sample and pleasantness in the German sample were the reactions that best

represented the hedonic dimension, which some research suggests is the most important dimension in terms of people's reactions to interactions (e.g., Osgood, Suci, & Tannenbaum, 1957). So we examined relationships between the FFM and other reactions, controlling for individual differences in enjoyment and pleasantness. This was done by a series of models in which at Level 1, each reaction was modeled as a function of enjoyment (or pleasantness) entered grand-mean centered. Grand-mean centering enjoyment (or pleasantness) adjusted the intercept of the dependent measure for between-person differences in mean enjoyment (or pleasantness).

In the U.S. sample, the pattern of results was clear. Any relationships between reactions and Extraversion and Agreeableness that were significant in the initial analyses were not significant in the adjusted analyses. Although a few of the adjusted coefficients were relatively unchanged in terms of size and remained significant at $p < .10$, overall, these results indicate that controlling for individual differences in enjoyment meaningfully reduced relationships between other reactions and Extraversion and Agreeableness. In contrast, the coefficients in the adjusted analyses representing relationships between reactions and Conscientiousness and Openness were relatively similar to the coefficients from the initial analyses (with the exception of the intimacy–Openness coefficient, which decreased from .56 to .24), and all that were significant in the initial analyses were significant in the adjusted analyses.

In the German sample, the pattern of results was also clear, but it was dissimilar to the pattern of results in the U.S. sample. Controlling for individual differences in enjoyment did not have much of an effect on relationships between the FFM and other reactions. For both Agreeableness and Conscientiousness, five of the six coefficients that were significant (or that were $p < .10$) in the initial analyses were significant in the adjusted analyses.

Quantity of Interaction

For present purposes, quantity of interaction was defined in terms of two measures: number of interactions per day and time spent per day in interaction. For these analyses, days (instead of interactions) were nested within persons. Similar to the analyses of quality, the Level 1 model was unconditional, and the Level 2 model contained a sex contrast variable and all five of the FFM measures. The average

number of interactions per day was 4.05 (between-person $SD = 1.55$) in the U.S. sample and 3.26 (between-person $SD = 1.41$) in the German sample. The average time spent per day in interaction was 271 minutes (between-person $SD = 119.9$) in the U.S. sample and 268 (between-person $SD = 102.1$) in the German sample.

For the American sample, Extraversion was positively related to both number of interactions per day ($\gamma_{02} = .33$, $p = .01$) and time per day spent in interaction ($\gamma_{02} = 25.1$, $p < .05$). More extraverted participants were more socially active. In contrast, for the German sample, there were no significant relationships between the FFM measures and either of these measures of quantity.

Nature of Interaction and Type of Interaction Partner as Mediators of Relationships Between the FFM and Reactions to Interactions

One of the assumptions of trait theory is that the situations people choose are related to their traits. For example, a person high in Agreeableness might avoid arguments more than a person low in Agreeableness. As discussed previously, if such relationships exist, they raise the possibility that relationships between the FFM traits and reactions to interactions (reported above) may have been due to individual differences in the distribution of interactions. We examined such possibilities by controlling relationships between the FFM and quality of interactions for individual differences in the distribution of interactions. We focused on two characteristics of interactions: the activity that was occurring and the nature of the relationships participants had with those with whom they were interacting.

First, a series of analyses determined whether the distribution of interactions varied as a function of FFM traits. This was done with Bernoulli models in which the dependent measure was a binary outcome indicating whether a certain type of person was present and whether an interaction was a certain type using the categories described previously.[2] Given that we had no hypotheses regarding rela-

2. These categorical data were also analyzed with multilevel multinomial models that included all categories. The estimates produced by these analyses were very similar to the estimates produced by the Bernoulli models. In light of the greater simplicity of the Bernoulli analyses and the fact that these analyses provided a more direct means than the multinomial analyses of testing relationships between frequency of occurrence and individual differences in the FFM, the results of the Bernoulli models are discussed.

tionships between FFM factors and interaction characteristics, and that there were few dominant patterns, we do not report the results of these analyses in detail.[3]

These analyses were followed by analyses that controlled relationships between FFM factors and quality of interaction for individual differences in interaction characteristics that were significantly related to FFM factors. This was done by entering a dummy-coded variable representing an interaction characteristic (e.g., whether a friend was present) into the Level 1 model grand-mean centered. When Level 1 predictors are grand-mean centered, the intercept is adjusted for Level 2 differences in the predictor. We controlled only for those types of interactions that were significantly related to measures of the FFM.

For example, for the U.S. sample, the percent of interactions that involved a romantic partner was positively related to Openness, and the percent of interactions that involved a friend was positively related to Extraversion. Analyses that controlled for individual differences in the percent of interactions involving romantic partners or friends found that relationships between FFM factors and reactions to interactions that were significant in the original analyses remained significant after controlling for individual differences in these measures. Similar results were found when individual differences in nature of interaction (activity) were controlled. In the few instances in which a coefficient representing a relationship between an FFM factor and a reaction to interaction changed when partners or activities were controlled, such changes were minor (e.g., a coefficient that was significant at .05 originally, was significant at .07 in the new analysis).

For the German sample, Conscientiousness was positively related to the percent of interactions that involved work and was negatively related to the percent of interactions involving an acquaintance. Similar to the results of the analyses of the U.S. sample, controlling for individual differences in the percent of interactions involving different interaction partners and different natures did not change relationships between FFM traits and reactions to interactions.

3. Details of these analyses are available from the authors. In deciding the characteristics of interactions for which we should control FFM-quality relationships, we used a generous p level ($p < .10$) under the assumption that we wanted to be certain to take into account characteristics that might be related to FFM factors.

For both the U.S. and German samples, it appears that individual differences in the distribution of interactions were not responsible for relationships between FFM factors and reactions to interactions. Such a finding suggests that relationships between reactions to interactions and traits reflect differences in how people behave or react during interaction per se and does not reflect their selection of different types of interactions.

DISCUSSION

As expected, we found both similarities and differences between the United States and Germany in relationships between the traits of the FFM and measures of social interaction. As hypothesized, in both countries there were positive relationships between reactions to interactions and Agreeableness and Conscientiousness. Somewhat surprisingly, we found no significant relationships between Neuroticism and reactions to interactions in either sample. Consistent with our expectations, in the U.S. sample, reactions to interactions were also positively related to Extraversion and to Openness, although in the German sample, there were no relationships between these two factors and reactions to interactions.

In terms of quantity of social interaction, as expected, Extraversion was positively related to social activity in the U.S. sample. More extraverted people had more interactions and spent more time with others than less extraverted people. In the German sample, there were no such relationships. Although there were some relationships between FFM variables and the distribution of interactions (across different activities and interaction partners), these relationships were not consistent across the two samples. Most important, however, the results suggested that individual differences in the distributions of interactions that were related to FFM factors did not account for relationships between the FFM reactions to interactions.

In the following discussion, we will try to integrate the diverse findings of these two studies, and out of necessity, we will focus on the broad trends in the results and will not try to explain each and every result. To our knowledge, the present study is the only one of its kind, and although the issues with which it deals (the relationships between personality and social behavior) are central to an under-

standing of how personality manifests itself cross-culturally, research and theory concerning these issues are somewhat limited. It is noteworthy that in their *Annual Review* article on culture and personality, Triandis and Suh (2002) focused (almost exclusively) on the structure and measurement of personality. They paid virtually no attention to cross-cultural similarities (or differences) in the manifestation of personality traits.

Agreeableness and Conscientiousness

In both samples, we found positive relationships between Agreeableness and Conscientiousness and reactions to social interactions. Although Conscientiousness as defined within the context of the FFM would seem to refer to the task or agentic aspects of life (persevering until a task is finished, doing things efficiently, etc.), more conscientious people should make better interaction partners. Conscientiousness includes making and fulfilling plans, which can include plans involving other people, and being reliable and organized, which can include reliability and organization in the interpersonal domain. Short of being obsessive, being prepared, organized, and reliable makes someone a more predictable and less anxiety-producing interaction partner, which, in turn, should lead to more rewarding interactions. Such a possibility is consistent with the findings of Jensen-Campbell and Graziano (2001), who found that Conscientiousness was positively related to solving daily interpersonal conflicts and to the use of negotiation to solve conflicts.

The relationships between Agreeableness and interaction quality replicate previous research in both cultures, and they are consistent with how Agreeableness is operationally defined within the FFM. For example, on the BFI-44, Agreeableness is defined in terms of not finding fault with others, being helpful and unselfish, being kind and considerate, and so forth. Individuals who possess these characteristics to a greater degree probably make interactions more positive than those who possess them to a lesser degree.

Extraversion and Openness

In the U.S. sample, Extraversion and Openness were positively related to quality of social interaction, and Extraversion was positively related to social activity, whereas there were no such relationships in the German sample. We think that these differences reflect

differences between the two countries in the norms that guide social interaction. German society is often regarded as being more formal and structured than U.S. society, and consequently, in the United States, openness, friendliness, being outgoing, and so forth are probably more desirable (and normative) than they are in Germany. Individuals who act more normatively may be more successful in social interaction—they act as they are supposed or expected to act. The positive relationships we found between Extraversion and interaction quality are similar to those of Jensen-Campbell and Graziano (2001), who found, in a diary study of daily conflict, a positive relationship between Extraversion and solving conflicts.

Given that previous research has found positive relationships between various aspects of social contact and Extraversion in German samples, it seems appropriate to discuss previous research more critically in light of the fact that we found no such relationships in our German sample. Our sense is that a partial explanation of the differences between our results and those of previous studies may be due to the fact that much of the previous research on German samples has not used social interaction diaries per se; rather, they have used various types of single-occasion, retrospective questionnaires, which can be prone to various biases (e.g., Reis & Gable, 2000).

For example, Neyer and Asendorpf (2001), who found that Extraversion was positively related to closeness of relationships, did not study social interaction per se; rather, they used a retrospective measure of relationships, which, although valuable, does not provide the same type of information provided by a diary method such as the one we used. Asendorpf and Wilpers (1998) used a similar questionnaire to Neyer and Asendorpf and a social interaction diary and reported significant relationships between the FFM and only one of the measures they collected in their social interaction diary (conflict with opposite-sex peers and Agreeableness). They did not describe the eight other measures they obtained for each interaction, and it is not clear if there were other significant relationships.

In terms of quantity of interaction, it is not entirely clear how Asendorpf and Wilpers (1998), who found a positive relationship between Extraversion and amount of contact, measured quantity. The authors noted that "participants were instructed to decompose group interactions into up to five major dyadic interactions with group members and to record each such interaction separately" (p. 1534). Given this, it seems as if their measure of quantity was

some sort of combination of number of interactions and number of people present in an interaction, which seems to confound these two different measures of social activity. Moreover, to our knowledge, such a scoring technique has not been used in any other social interaction diary study.

Openness has not figured prominently in research about relationships between the FFM and the social aspects of life. Most personologists probably think of Openness in terms of intellectual openness, openness to new ideas, and so forth. Nonetheless, in formulating our hypotheses and expectations, we were guided by McCrae (1996), who emphasized the experiential aspect of Openness. Within such a context, more open people may be more open to others, an openness that may manifest itself in different ways. For example, more open individuals may be more willing (or able) to consider another's position on an issue. Such a possibility would not imply agreement, just an increased understanding of the rationale for another's opinions. In terms of intimate relationships, Openness may be related to people's willingness to merge the self and the other (Aron et al., 2004) or to think of relationships in more communal (vs. agentic) terms.

Nevertheless, assuming the explanations for the American results have some validity, it remains to be explained why such (theoretically) basic processes do (or may) not apply in Germany—that is, why were there no relationships between Openness and Extraversion and social interaction quality and quantity in the German sample? A failure to find relationships always raises questions of statistical power, and although power calculations in multilevel analyses are not well understood, by most rules of thumb, the number of observations at both levels of analysis in the German sample was enough to provide reasonable power (e.g., Richter, 2006).

One possible explanation relies upon the differences between U.S. and German societies that Hofstede (2001) reported. As mentioned in the introduction, Hofstede found that Americans were higher on individualism and lower on uncertainty avoidance than Germans. Such a combination would seem to provide a context in which Openness and Extraversion would be adaptive dispositions. To some extent, Extraversion is about how much individuals assert themselves and speak out, irrespective of any norms. None of the Extraversion items on the BFI–44 Extraversion concern (or mention) situational constraints in any way. Similarly, Openness has a bit of

nonconformity in it, and those who are high on Openness seek the novel (and may also seek the uncertain). In contrast, a society in which individualism was not valued as strongly and in which the motive to avoid uncertainty was stronger would seem to provide a context in which Openness and Extraversion were less adaptive. See McCrae and Sutin (2009) for a discussion of this possibility regarding Openness.

We realize that the foregoing is somewhat speculative, and the present results require replication. Nevertheless, the diary method and measure of personality we used are well validated and have been used successfully in the past, and as discussed above, the existing research on relationships between everyday social interaction and Extraversion (and the FFM in general) is not as extensive as it might appear to be at first glance. Although the FFM may be a cross-culturally valid model of individual differences, how these individual differences are manifested in different cultural settings is not well researched or well understood.

Neuroticism

One of the more surprising results of the present study was the lack of relationships between Neuroticism and reactions to interactions in both the U.S. and German samples. Assuming that the lack of relationships was not due to inadequate power leaves this interesting question: Why was/is Neuroticism not related to experiences in social interaction?

The answer to this question may lie in the nature of Neuroticism as defined within the context of the FFM. Within the context of the BFI-44, Neuroticism is measured by asking participants to indicate the extent to which "I see myself as someone who . . ." to the following eight items: Is depressed, blue; Is relaxed, handles stress well; Can be tense; Worries a lot; Is emotionally stable, not easily upset; Can be moody; Remains calm in tense situations; Gets nervous easily. None of these items explicitly concerns interpersonal relationships. In fact, the emphasis of the items is intrapersonal—anxiety, instability, negative affect, and so forth. An individual who scores high on Neuroticism may not act in ways that create the most pleasant social environments, but he or she may not act in ways that create particularly unpleasant social environments. Moreover, a meaningful proportion of the items of many measures of Neuroticism (including

the BFI-44) focus on reactions to negative circumstances, and negative social interactions are relatively rare (e.g., Nezlek, 2000b). This suggests that the instability and negative affect that characterize neurotics may not be readily apparent in everyday social interaction.

Contrast Neuroticism (as measured peviously) with depression, a construct that has been found to be related to reactions to social interaction (e.g., Nezlek et al., 1994; Nezlek, Hampton, & Shean, 2000). Although some aspects of depression concern the intrapersonal (e.g., feeling sad), in research and theorizing about depression, disturbed or distressed interpersonal relationships figure prominently (e.g., Coyne, 1976). The lack of relationships between social interaction and Neuroticism combined with the demonstrated relationships between social interaction and depression highlight the importance of distinguishing Neuroticism (a broadly focused measure of a personality trait) from depression, a more specifically focused measure of an individual difference in well-being. Admittedly, Neuroticism contains an element of depression, but this is only a small part of the broader construct.

Cultural Differences in the Centrality of the Hedonic Dimension

Unexpectedly, individual differences in how enjoyable interactions were appeared to mediate relationships between other measures of interaction quality and Agreeableness and Extraversion for the U.S. sample. Enjoyment did not mediate relationships between quality and Conscientiousness and Openness in the U.S. sample, nor any relationships between quality and FFM factors for the German sample.

That enjoyment (perhaps the closest measure we collected of positive affect per se) seemed to be the measure of social interaction through which Extraversion and Agreeableness were related to other measures (at least in the U.S. sample) is consistent with some models of personality that discuss personality in terms of affect or temperament (e.g., Clark & Watson, 1999). Moreover, Extraversion and Agreeableness are sometimes discussed as having an important affective component, and assuming this is the case, our measure of enjoyment may have been a state-level proxy for the affective component of these two traits. In contrast, Conscientiousness and Openness are rarely discussed in affective terms, so the fact that

enjoyment did not mediate relationships between other measures and these two traits is consistent with affect-based models of personality.

Assuming this argument is plausible still leaves the question of why this did not occur in the German sample. One explanation would be that the measures of interaction were not related with sufficient strength to provide a basis for mediation in the German sample. This was not the case, however. Additionally, unreported analyses found that within-person relationships in the German sample were approximately the same strength as within-person relationships in the U.S. sample.

This difference may have been due to differences between the samples in the social milieus, including differences in the people with whom participants interacted. The U.S. sample lived on a campus, and most of their interactions were with fellow students, who were probably considered to be friends of some sort, whereas interaction partners in the German sample were more heterogeneous (e.g., they included family members). Thus, enjoyment may have been a more central, defining feature of interactions in the U.S. sample compared to the German sample, in which responsibilities and obligations may have been more important. Differences between the two samples in the distribution of variances of the enjoyment/pleasantness are consistent with such a possibility. In the German sample, more of the variance in pleasantness was at the interaction level compared to the variance in enjoyment that was at the interaction level in the U.S. sample (84% vs. 71%), indicating more uniformity in the enjoyment Americans experienced compared to the Germans. Although such an explanation is speculative and requires replication, to our knowledge, ours is the first study to consider such a possibility.

Causal Relationships

Although the logic and language of multilevel modeling may imply that Level 2 measures (i.e., FFM traits) are causes of Level 1 measures (i.e., measures of interactions), this is not technically the case. Moreover, the static design of the present study does not provide a basis for drawing inferences about causal relationships between the FFM and daily social interaction. Nevertheless, there are reasons to believe that personality traits were causes and characteristics of interactions were effects. First, theoretically, personality traits have long been presumed to have causal precedence, reflecting the general principle that internal states manifest themselves in external behaviors.

More important, there is research specifically concerning causal relationships between social interaction and personality that suggest a causal relationship from personality to interaction. In a panel study with multiple data collections over 18 months, Asendorpf and Wilpers (1998) found that FFM scores predicted measures of social contact, whereas they found no support for causal relationships from contact to personality. Similarly, in another panel study (two sets of measures taken 2 years apart), Nezlek (2001) found causal relationships from social skills to social interaction but no causal relationships from social interaction to social skills. Also, Neyer and Asendorpf (2001), in a two-wave panel study conducted over 4 years, found that the predominant causal direction relationship was from individual differences in personality (including the FFM) to relationship qualities. Nonetheless, it is possible that people's experiences in social interaction lead to changes in their personalities. For example, people who have more rewarding interactions may become more agreeable and extraverted. Such questions can be answered only by studies specifically designed to address questions of causality.

Some Limitations

Clearly, the present results need to be evaluated within the context of the samples that were studied. They were student samples, and there was only one sample from each country. Although it is not clear why relationships between the FFM and social interaction should vary regionally or by age in the United States or Germany, such possibilities need to be examined using more heterogeneous samples. Moreover, a fuller explanation of how culture shapes the manifestation of personality requires data from more than two countries.

We presented analyses describing relationships between the FFM and social interaction separately for each country. Although we could have conducted some analyses in which the two samples were combined, we did not do this for various reasons. First, combined analyses could not have included all reactions to interactions because different reactions were measured in the two studies. Moreover, even reactions that were roughly equivalent across the two studies may not have been sufficiently similar to allow for combining the samples (e.g., *Influence* in the U.S. sample vs. *Dominant* in the German sample). These two studies were not originally designed to be combined with each other, and studies that were explicitly designed to be

directly comparable are needed to provide a better basis to compare coefficients statistically.

Finally, there is also the issue of how we defined social interaction. We limited our study to face-to-face contact. Nevertheless, the use of various forms of electronic communication is increasing dramatically, and although electronic communication may not be the same as face-to-face contact, it may be an important form of contact in its own right and therefore may merit examination.

CONCLUSIONS

The present results suggest that relationships between personality traits and social interactions can vary as a joint function of the trait being considered and the country or the culture being examined. Relationships between reactions to interactions and Agreeableness and Conscientiousness were similar (positive) in both the German and U.S. samples, and there were no relationships between reactions and Neuroticism in either sample, whereas relationships between reactions and Extraversion and Openness differed considerably.

Of course, the present study is limited by the fact that only two cultures were studied, and these cultures were similar in terms of numerous dimensions that are frequently used to distinguish cultures, such as individualism and collectivism. Future research needs to examine the types of relationships we examined across more cultures that differ meaningfully from one another in important ways. Regardless, we think the present results demonstrate that studying cross-cultural similarities and differences in relationships between personality and naturally occurring social interaction is both practical and informative.

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