Employing Contemporary Integrative Interpersonal Theory to Understand Dysfunction in Those at Clinical High Risk for Psychosis

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Poor social functioning is related to the development of psychosis; however, our current understanding of social functioning in those at-risk for psychosis is limited by (a) poor conceptual models of interpersonal behavior and (b) a reliance on comparisons to healthy controls (e.g., vs. clinical controls). In this study, we introduce Contemporary Integrated Interpersonal Theory (CIIT) and use its Interpersonal Circumplex (IPC) model to compare interpersonal behavior traits in those at clinical high-risk (CHR) for psychosis, clinical controls, and healthy controls. A community sample ($N = 3460$) was used to derive estimates of IPC dimensions (i.e., affiliation and dominance), which were then compared among a large subsample that completed diagnostic interviews ($N = 337$), which included a CHR group, as well as several control groups ranging on degree of psychosis vulnerability and internalizing disorders. CHR individuals were distinguished from healthy controls by low affiliation ($d = -1.31$), and from internalizing disorder groups by higher dominance ($d = 0.64$). Negative symptoms were consistently associated with low affiliation and low dominance, whereas positive symptoms were related primarily to coldness. These results connect social functioning in psychosis risk to a rich theoretical framework and suggest a potentially distinct interpersonal signature for CHR individuals. More broadly, this study suggests that CIIT and the IPC may have utility for informing diagnostics and treatment development in psychosis risk research.

Key words: psychosis risk/clinical high risk/comorbidity/social processes/interpersonal circumplex

Introduction

Individuals at clinical high risk (CHR) for developing a psychosis spectrum disorder experience attenuated positive symptoms (e.g., subtle perceptual abnormalities) and often have social functioning deficits.[1,2] Social functioning is conceptualized and measured by considering multiple social outcomes (e.g., few peer relationships),[3] which collectively predict conversion to psychosis and may be a treatment target.[4,5] Nonetheless, little is known about the processes that contribute to poor social functioning. For instance, although research has indicated there are social-cognitive deficits in CHR individuals, it is unclear how such processes specifically relate to poor functioning.[6,7] In particular, little is known about the interpersonal behavior of CHR individuals, which may link momentary social-cognitive processes to social functioning. The present study sought to address this limitation by introducing a theoretical framework for understanding interpersonal behavior and exploring its utility for psychosis risk research.

In this article, we present Contemporary Integrative Interpersonal Theory (CIIT) as a framework for understanding interpersonal behavior tendencies in CHR individuals. CIIT provides a well-validated model for describing interpersonal behavior and a connection to basic research on social interactions, which has proven useful for understanding diverse forms of psychopathology (substance use, anxiety, personality disorders, etc.).[8,9] We begin by reviewing basic principles of CIIT and their relevance to CHR research, then present data comparing CHR individuals to clinical and healthy control groups.

Contemporary Integrative Interpersonal Theory and Psychosis Risk

CIIT is a theory of social/interpersonal functioning that is broad in scope and its history, assumptions, and findings have been reviewed in detail elsewhere.[10] Notably, it aims to integrate multiple levels of interpersonal experience and thus spans a wide array of psychological constructs and processes, including: perception, mental representation (e.g., memories), motivation, and behavior.[11] The present study is focused on interpersonal behavior, thus we present four core CIIT tenets with this in mind: (a) interpersonal behavior is a key unit of analysis, (b) behavior within social interactions is predictably interactive, (c) individuals have relatively stable behavior patterns (e.g., traits), and (d) interpersonal behavior can be described by the interpersonal circumplex (IPC).[11] The final point, regarding the IPC as a descriptive model, may be particularly relevant to resolving limitations within the CHR literature.

The IPC (see figure 1) can describe interpersonal behavior on varied time scales (seconds, months, years, etc.) and is defined by a vertical axis of dominance (vs. submissiveness) and a horizontal axis of affiliation (e.g., warmth vs. coldness), which blend together to define all points within the model.[10] Beyond describing behavior, the IPC is connected to a theory of moment-to-moment interaction dynamics, in which one person's behavior probabilistically predicts another (i.e., warmth pulls for warmth, dominance invites submission).[12] In addition to fluctuating behavior, the IPC also captures relatively stable interpersonal traits that are linked to social outcomes over longer spans of time.[13] In contrast, existing research on interpersonal behavior in CHR individuals is focused on the prese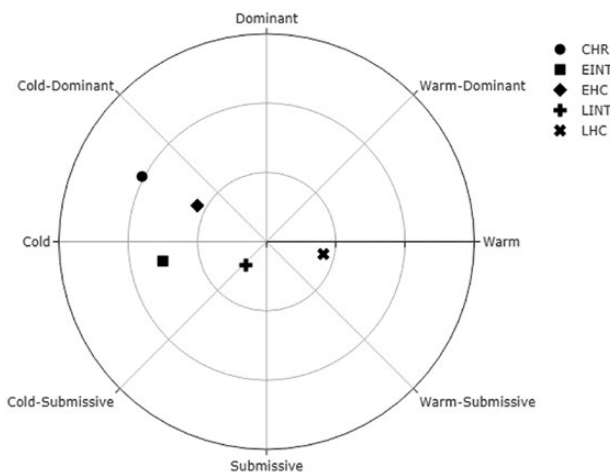nce or absence of behaviors such as nonverbal expression, fluency, and tangentiality.[14,15] Although relevant to CHR symptoms, it is unclear how such behaviors affect social interactions or how their persistence over time shapes social outcomes. The ability to integrate these momentary interaction dynamics and stable traits represents a major strength of the IPC relative to other interpersonal trait models (e.g., Five-Factor Model) and may advance the CHR literature.

An important foundation for future research is understanding interpersonal traits in CHR individuals. Mondrup and Rosenbaum (2010) provide the only such study of the IPC, comparing individuals with CHR ($N = 12$) and psychosis spectrum diagnoses ($N = 12$).[16] They found that individuals with CHR and psychosis diagnoses reported varied interpersonal problems; however, social withdrawal (i.e., low affiliation and high submissiveness) was reported most strongly. This is consistent with the relevance of negative symptoms in CHR samples.[17] Beyond the reliance on small samples, these findings are limited in that they do not: (a) provide comparisons to commonly comorbid mental disorders and (b) differentiate dimensions of psychosis risk. Such comparisons would add specificity to our understanding of interpersonal traits in CHR individuals.

The utility of clinical control groups in CHR research deserves further consideration. Millman, Gold, Mittal, and Schiffman (2019) argue that the CHR literature has relied too heavily on healthy control comparisons—prioritizing large effects over validity and clinical utility.[18] The present study focused on two comparison groups identified by Millman and colleagues: internalizing disorders (anxiety, depression, etc.) and nonclinical psychosis vulnerability. Previous research on the IPC suggests that many internalizing disorders are related to social withdrawal,[8] paralleling the findings described above for CHR syndromes and highlighting the importance of this comparison group. Nonclinical psychosis vulnerability populations represent another important comparison group, as these individuals may carry risk genes and have relatively stable psychosis-like experiences (e.g., schizoptypy), but do not present with the severity, distress, impairment, trajectory, and other features that define formal CHR syndromes. In addition to developing a better understanding of social functioning in CHR individuals, comparisons to both internalizing and psychosis vulnerable groups may improve the efficiency and accuracy of identifying CHR cases in research and clinical settings.

Fig. 1. CHR, Clinical high risk Psychosis; EINT, Elevated Psychosis Vulnerability-Internalizing; EH, Elevated Psychosis Vulnerability Healthy; LINT, Low Psychosis Vulnerability-Internalizing; and LH, Low Psychosis Vulnerability-Healthy. Axes are Scaled in 0.5 standard deviation Units.

Present Study

Social functioning is an important aspect of the psychosis risk; however, previous research has not provided a useful framework for understanding interpersonal behaviors within CHR individuals. In the present study, we examined the utility of the IPC for describing the interpersonal tendencies of CHR individuals. As a first

step, dominance and affiliation scores were created from existing questionnaire data on a large community sample with varied degrees of psychosis vulnerability (N = 3460). Next, we used diagnostic interview data on a subset of these participants (N = 337) to compare the interpersonal traits of individuals with a CHR diagnosis, internalizing diagnosis (i.e., clinical controls), and healthy controls. Importantly, in-line with Millman and colleagues (2019), we also examined the effect of psychosis vulnerability within control groups. Finally, psychosis subdimensions were correlated with dominance and affiliation scores, to examine whether they show differential relations to interpersonal traits.

Methods

Participants and Procedures

Data were used from the Multisite Assessment of Psychosis-Risk study of psychosis risk markers in a representative community sample.[19] Study sites included Philadelphia, Chicago, Baltimore, and their surrounding areas. Recruitment methods included internet advertisements (Facebook, Craig's list, etc.), student volunteer pools, and flyers. Each study site complied with APA ethical standards for the treatment of participants and study protocols were approved by the Institutional Review Board at each site.

Participants completed measures in two phases. In Phase 1, participants completed questionnaires online pertaining to psychosis risk, mental health, and functioning. The Prodromal Questionnaire (PQ) positive symptoms scale and the PRIME screen questionnaire were used to identify two groups: potentially high psychosis risk individuals and low-scoring control participants.[20,21] Individuals in these two groups were recruited for Phase 2, which involved structured interviews. In the present study, data were used from 3460 participants in Phase 1 and 337 from Phase 2 (Fifty-five Phase 2 participants were excluded because they did not fit into existing groups, based on psychosis vulnerability and diagnoses, and would have resulted in groups with small sample sizes (e.g., high psychosis vulnerability and a substance use disorder, N = 24).). Phase 1 participants were on average 20.18 years old (SD = 1.86), 78.41% were female, and 56.89% of participants identified as White, 29.34% as Asian, and 17.35% as Black. In addition, 10.36% of the sample identified as Hispanic. The median household income was $70 000–$99 999.

To create clinical comparison groups, we categorized Phase 2 participants using (a) self-report psychosis risk from Phase 1, (b) Phase 2 psychosis risk syndromes, and (c) Phase 2 mental health diagnoses. As noted above, participants selected for Phase 2 were screened at Phase 1 using questionnaires. These questionnaires reflect reports of psychosis-like experiences that are related to CHR syndromes, but do not guarantee such syndromes are present; thus, they were used to indicate "elevated psychosis vulnerability" and "low psychosis vulnerability." The presence or absence of CHR syndromes, internalizing diagnoses, and other psychiatric disorders were confirmed by clinical interviews during Phase 2. From this data, we created five groups. CHR participants (N = 69) had both elevated psychosis vulnerability (We ultimately excluded the 9 low psychosis vulnerability CHR participants, as this was considered too be to small of a sample size for useful comparisons.) and met criteria for at least one psychosis risk syndrome, but were not excluded for meeting criteria for other mental health diagnoses (e.g., internalizing). Elevated psychosis vulnerability-internalizing participants (N = 68), had elevated psychosis vulnerability and met the criteria for an internalizing disorder, but could not have a psychosis risk syndrome or noninternalizing mental health diagnoses (e.g., substance use disorders). Elevated psychosis vulnerability-healthy participants (N = 49) had elevated psychosis vulnerability, but did not meet criteria for a psychosis risk syndrome or mental health diagnosis. Low psychosis vulnerability-internalizing (N = 45) had low psychosis vulnerability and met criteria for an internalizing disorder, but could not meet the criteria for a psychosis risk syndrome or any other mental health diagnosis. Healthy participants (N = 106) had low psychosis vulnerability and did not meet the criteria for a psychosis risk syndrome or any mental health diagnosis. Further demographic and diagnostic information on Phase 2 participants is provided in table 1.

Phase 1 Measures: Self-Report Questionnaires

Self-report questionnaires from Phase 1 were used to develop dominance and affiliation composites. A rational-empirical strategy was used for developing composites. First, individual questionnaire items from the study battery were examined for interpersonal content, based on comparisons to relevant IPC measures.[22,23] Second, correlational and factor analyses were used to choose the best items for the final dominance and affiliation composites (see Analyses section). All measures contributing items to the final dominance and affiliation estimates are briefly described below.

Ten Item Personality Inventory (TIPI).. The TIPI is a brief measure of big five personality traits and its scales have demonstrated adequate reliability and validity, despite each scale only having two items.[24] The present study used items from the TIPI extraversion and agreeableness scales. These items were rated on a 7-point Likert scale ("Strongly Disagree" to "Strongly Agree"). Notably, previous research has indicated that extraversion and agreeableness reflect blends of dominance and affiliation, such that extraversion and agreeableness items can be used to estimate dominance and affiliation.[25]

Table 1. Demographics and Diagnoses for Phase 2 Participants

	CHR	E-INT	E-Healthy	L-INT	L-Healthy
N	69	68	49	45	106
Age	20.22 (1.64)	20.21 (1.92)	19.78 (1.71)	20.29 (1.70)	20.07 (1.83)
Sex (Female)	51 (75%)	58 (85%)	38 (78%)	41 (91%)	78 (74%)
Race					
White	43 (62%)	38 (56%)	20 (41%)	25 (56%)	59 (56%)
Asian	17 (25%)	22 (32%)	18 (37%)	15 (33%)	32 (30%)
Black	13 (19%)	13 (19%)	12 (24%)	9 (20%)	17 (16%)
Other	3 (4%)	2 (3%)	0 (0%)	1 (2%)	1 (1%)
Ethnicity					
Hispanic	4 (6%)	9 (13%)	0 (0%)	4 (9%)	8 (8%)
Non-Hispanic	65 (94%)	59 (85%)	49 (100%)	41 (91%)	98 (92%)
Household Income[1]	$35 000–$49 999	$50 000–$69 999	$50 000–$69 999	$70 000–$99 999	$70 000–$99 999
CHR Diagnosis	69 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
INT Diagnosis	50 (72%)	68 (100%)	0 (0%)	45 (100%)	0 (0%)
Depressive	21 (30%)	37 (54%)	0 (0%)	12 (27%)	0 (0%)
Anxiety	43 (62%)	55 (81%)	0 (0%)	34 (76%)	0 (0%)
Trauma/Stressor	6 (9%)	12 (18%)	0 (0%)	1 (2%)	0 (0%)
Eating	7 (10%)	10 (15%)	0 (0%)	5 (11%)	0 (0%)
OCD	12 (17%)	10 (15%)	0 (0%)	5 (11%)	0 (0%)
Other Diagnoses					
Bipolar	9 (13%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Substance Use	20 (29%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note: CHR, clinical high risk for psychosis; INT, internalizing; E, elevated vulnerability for psychosis; L, low vulnerability for psychosis. The standard deviation for age is present in parenthesis.
[1]Median household income is reported for all participant groups.

Social Functioning Scale (SFS). . The SFS is a questionnaire measuring social functioning in individuals with psychosis.[26] This version of the SFS consists of 47 items and covers varied social domains, including: social withdrawal, independence, prosocial behavior, and self-perceived social competence in varied settings (e.g., work). Responses are recorded on a 4-point Likert scale (i.e., "Never" to "Often").

Prodromal Questionnaire (PQ). . The PQ is a 92-item questionnaire that assesses symptoms relevant to CHR syndromes.[27] Participants are asked to rate their experiences from the past month on a 5-point Likert scale (i.e., "0 times" to "Daily"). Although this includes positive, negative, and disorganized symptoms, it also includes an array of "general symptoms" that include depression, difficulties in role functioning, and interpersonal difficulties. Only items from the negative and general symptom scales contributed to dominance and affiliation composites. No items from the positive scale, which was used for screening at Phase 1, were used in these composites.

Phase 2 Measures: Structured Clinical Interviews
During Phase 2 clinical interviews were administered to both elevated and low vulnerability participants. All interviews were administered by trained staff supervised by Ph.D. level clinical psychologists.

Structured Interview for Psychosis Risk Syndromes (SIPS). . The SIPS is a semi-structured interview used to identify CHR syndromes.[28] Although the SIPS assesses negative, disorganized, and general symptoms, the present study focused on positive symptoms. The positive symptom dimensions include: unusual/delusional thoughts, suspiciousness/persecutory ideas, grandiosity, perceptual abnormalities, and disorganized communication. These symptom dimensions are rated on a 0-to-6 scale, where 0 represents absence of the symptom, 3–5 represent attenuated positive symptoms consistent with a CHR syndrome, and 6 represents presence of psychosis. The SIPS was used to diagnosis CHR syndromes and as a detailed assessment of individual positive symptoms. Participants with CHR syndromes ($N = 69$) included 32 for Attenuated Positive Symptoms Syndrome (APSS) currently progressing, another 36 for APSS current persistence, and 1 for Genetic Risk and Deterioration current persistence.

Structured Clinical Interview for DSM-5 Research Version (SCID-5-RV). . The SCID-5-RV is a semi-structured interview used to identify the presence or absence of *DSM-5* diagnoses.[29] Modules for psychotic, bipolar, depressive, anxiety, obsessive-compulsive, trauma-related, eating, and substance use disorders were administered to all participants. In the present study, data on depressive, anxiety, trauma-related, and eating disorders were used

to identify participants who met criteria for a current internalizing disorder.[30]

Negative Symptom Inventory-Psychosis Risk (NSI-PR).. The NSI-PR is a semi-structured interview assessing negative symptoms across five domains: avolition, asociality, anhedonia, blunted affect, and alogia.[31] These domains are comprised of individual items that are assessed on a 0 (absent) to 6 (extremely severe) scale.

Analyses

First, composite scores for the IPC dimensions of dominance and affiliation were derived from self-report questionnaire data. Our approach was guided by previous research showing that extraversion and agreeableness can be transformed to create dominance and affiliation scores.[25,32] The TIPI extraversion and agreeableness scales only contained two items, thus to ensure adequate construct coverage,[33] we added items from other measures in the dataset. We reviewed Phase 1 questionnaire items for relevance to extraversion and agreeableness. Following this, we chose items that correlated with TIPI extraversion and agreeableness, then included them in exploratory factor analyses (EFA) with TIPI items to identify which items defined the latent extraversion and agreeableness factors most effectively. Principle axes factor analyses with orthogonal varimax rotations were used, based on the ultimate goal of estimating orthogonal dominance and affiliation dimensions. We aimed to choose items that loaded strongly on their desired factor (e.g., >.50) and only weakly on the opposite factor (e.g., <.30). To create the final composites, we standardized all items and summed them according to the direction of their factor loading (e.g., negative for low extraversion). Next, the following transformation (This transformation is based on previous research that dominance reflects high extraversion (warm-dominant) and low agreeableness (cold-dominant), whereas affiliation reflects high extraversion (warm-dominant) and high agreeableness (warm-submissive). The numbers reflect trigonometric transformations commonly used in scoring circumplex measures.[32]) was applied to the standardized composites, to create the composite scores:

Dominance = .707*Extraversion – .707*Agreeableness
Affiliation = .707*Extraversion + .707*Agreeableness

Second, the validity and utility of these dimensions in relation to psychosis risk groups and variables was examined using data from Phase 2. Relevant groups were compared via their scores on the dominance and affiliation composites. We used the following categories that were described above: at-risk CHR, elevated psychosis vulnerability-internalizing, elevated psychosis vulnerability-healthy, low psychosis vulnerability-internalizing, and low psychosis vulnerability-healthy. One-way analyses of variance (ANOVA) were employed to compare groups on dominance and affiliation composites, with subsequent Tukey's HSD posthoc tests (α = .05) and Cohen's *d* used to explore significant ANOVA results. Next, we examined the correlations of specific positive and negative symptoms with the dominance and affiliation in both elevated ($N = 186$) and low ($N = 151$) psychosis vulnerability samples. Specifically, we used the SIPS positive symptoms scales and NSI-PR negative symptoms scales. All analyses were performed in RStudio (version 1.3.1056), using the psych package.[34]

Results

Affiliation and Dominance Composites

We identified six items that complemented and extended the TIPI extraversion and agreeableness scales, with three for each scale (We identified 89 items with content relevant to interpersonal behavior and, based on zero-order correlations, examined 15 of these items in initial factor analyses with extraversion and agreeableness items. Items were iteratively removed until the most interpretable factor loading patterns were obtained.). When analyzed in the full Phase 1 sample ($N = 3460$), a strong extraversion factor emerged (see table 2); however, the agreeableness factor was weaker (e.g., lower factor loadings). Consistent with previous findings that psychosis risk may affect factor loading patterns,[35] a follow-up analysis examined these items in a subset of healthy participants (i.e., no SIPS or SCID diagnoses; $N = 167$). In healthy participants, agreeableness items showed stronger factor loadings and better differentiation from the extraversion factor. As described above, items were standardized and summed to create dominance and affiliation composites, which were used to compare groups and psychosis risk dimensions.

Group Comparisons

The location of each group within the IPC is displayed in figure 1, through plotting the dominance and affiliation composite scores. Separate ANOVAs were conducted for the dominance and affiliation composites, with group membership serving as the independent variable. The dominance ANOVA indicated significant differences between groups ($F[4, 332] = 4.46$, $P < .001$), with posthoc analyses demonstrating that this reflected CHR participants having higher dominance than participants in the elevated psychosis vulnerability-internalizing ($d = 0.64$, 95% CI [0.28, 0.99]), low psychosis vulnerability-internalizing ($d = 0.64$, 95% CI [0.23, 1.03]), and low psychosis vulnerability-healthy groups ($d = 0.50$, 95% CI [0.19, 0.81]). The affiliation ANOVA similarly indicated significant differences between groups ($F[4, 332] = 24.73$, $P < .001$); however,

here posthoc analyses showed a more complicated pattern (see figure 1 for summary). CHR participants reported the lowest levels of affiliation, relative to the low psychosis vulnerability-internalizing ($d = -0.74$, 95% CI [-1.15, -0.33]) and healthy groups ($d = -1.31$, 95% CI [-1.66, -0.96]). Elevated psychosis vulnerability-internalizing disorder participants were the next lowest in affiliation, with significant differences relative to low psychosis vulnerability-internalizing ($d = -.64$, 95% CI [-1.03, -0.24]) and low psychosis vulnerability-healthy groups ($d = -1.22$, 95% CI [-1.56, -0.87]). Elevated psychosis vulnerability-healthy participants had lower levels of affiliation than low psychosis vulnerability-healthy participants ($d = -0.99$, 95% CI [-1.35, -0.62]). Finally, low psychosis vulnerability-internalizing participants reported lower affiliation than low psychosis vulnerability-healthy participants ($d = -0.63$, 95% CI [-0.99, -0.27]).

Symptom Rating Correlations

Correlations of dominance and affiliation with SIPS positive symptoms and NSI-PR negative symptoms are presented in table 3, for both elevated and low psychosis vulnerability participants. Positive symptoms were generally related to low affiliation, though this was most strongly seen for suspiciousness. Correlations between positive symptoms and dominance were, generally nonsignificant, with the exception being the SIPS grandiose ideas scale with showed a small positive correlation with dominance in those with elevated psychosis vulnerability. Negative symptoms were related to both low affiliation and low dominance, with limited variation in correlation strength across scales. There were some differences in correlation magnitude across the elevated and low vulnerability groups; however, there were no significant correlations in opposing directions.

Table 2. Exploratory Factor Analyses of Extraversion and Agreeableness

		Full Sample		Healthy	
		EXT	AGG	EXT	AGG
TIPI1	Extraverted, enthusiastic.	**0.78**	–0.01	**0.80**	–0.01
TIPI6	Reserved, quiet.	**–0.68**	0.00	**–0.80**	0.07
SFS36	Attendance of parties (past 3 months)	**0.40**	–0.06	**0.50**	0.00
SFS8	Ease in talking to others	**0.59**	–0.23	**0.62**	–0.11
PQ21	Being quiet, keep in background (past month)	**–0.62**	**0.37**	**–0.65**	0.18
TIPI2	Critical, quarrelsome	0.10	**0.37**	0.06	**0.55**
TIPI7	Sympathetic, warm	0.06	–0.14	0.09	**–0.34**
PQ70	Angry, easily irritated (past month)	–0.15	**0.59**	0.01	**0.54**
PQ6	Not getting along at work or school (past month)	–0.06	**0.39**	–0.06	**0.47**
PQ66	Does not return social courtesies or gestures	**–0.37**	**0.49**	**–0.30**	**0.58**

Note. Standardized factor loadings are presented from principle axes factor analyses with varimax rotations. EXT, Extraversion; AGG, Agreeableness. The full sample consisted of 3460 participants, whereas the healthy subset consisted of 167 participants who did not have SCID or SIPS diagnoses.

Table 3. The Interpersonal Correlates of Positive and Negative Symptoms

	Elevated Vulnerability		Low Vulnerability	
	Dom.	Aff.	Dom.	Aff.
SIPS Positive Total	0.07	**–0.17**	0.01	**–0.31**
P1: Unusual Thought	–0.01	–0.05	0.06	–0.14
P2: Suspiciousness	0.14	**–0.22**	0.00	**–0.21**
P3: Grandiose	**0.16**	–0.06	–0.08	–0.12
P4: Perceptual Abnormalities	–0.02	–0.12	0.00	**–0.18**
P5: Disorganized Communication	0.01	–0.11	0.02	**–0.28**
NSI-PR Total	**–0.23**	**–0.43**	**–0.25**	**–0.27**
Avolition	–0.10	**–0.33**	–0.10	**–0.20**
Asociality	**–0.17**	**–0.41**	**–0.39**	–0.06
Anhedonia	**–0.21**	**–0.22**	0.00	**–0.21**
Blunted Affect	**–0.19**	**–0.22**	**–0.20**	**–0.20**
Alogia	**–0.18**	–0.10	**–0.20**	**–0.30**

Note: Dom., Dominance and Aff., Affiliation. Elevated psychosis vulnerability $N = 186$ and low psychosis vulnerability $N = 151$. All statistically significant ($P < .05$) correlations are in bold.

Discussion

Social dysfunction develops prior to psychotic disorders and often worsens as symptoms progress.[15] Despite considerable research on overall social functioning in CHR individuals, there has been little focus on interpersonal behavior. The present study addressed this through characterizing interpersonal traits in CHR individuals, then presenting comparisons to clinical and healthy controls. The results indicated that individuals with CHR syndromes describe themselves as being low in affiliation and having somewhat high dominance, which can be distinguished from participants with internalizing disorders who are more submissive. Finally, negative symptoms were consistently related to low affiliation and submissiveness, whereas positive symptoms were related mostly to low affiliation.

An Interpersonal Signature for CHR Individuals

The present findings that CHR individuals report low affiliation (e.g., coldness) and some dominance parallels research on schizotypal and paranoid personality disorders.[36] Other traits and behaviors linked to cold-dominance in previous research include: suspiciousness, sharing unpopular opinions, need for autonomy, expressing disagreement, maintaining distance, condescension, talking-over others, and hostility.[23,37,38] These findings in regards to cold-dominance are also consistent with research indicating that CHR individuals misunderstand social norms,[39] make hostile attributions of others' behavior,[6] and have difficulty regulating emotional responses to perceived exclusion.[40] Nonetheless, these results also contrast with findings that CHR syndromes relate to a withdrawn and submissive interpersonal style.[16,41] Further research is needed using validated IPC measures to confirm the present findings.

One benefit of CIIT is that it can be used to generate more complete theories and specific hypotheses regarding interpersonal processes in CHR individuals. First, low affiliation and high dominance have been linked to poor performance on facial emotion recognition tasks in healthy subjects.[42–44] This dovetails with findings of social-cognitive impairments in CHR individuals and may suggest cold-dominance links social cognition and broader functional outcomes observed in this population.[6] Second, previous research on CIIT embeds the present findings within a well-validated theory of interaction dynamics.[12] Specifically, CIIT predicts that cold behavior will evoke coldness in others and that dominant behavior invites submissiveness (i.e., complementarity). To the extent that cold-dominance occurs across interactions and relationships, it may impede the ability of CHR individuals to form new relationships and causes distress within existing ones.[13] Linking both social cognition and interaction dynamics is research showing that facial expression perception can be understood in terms of dominance and affiliation,[45] as well as work showing individual differences in the extent to which perceptions of dominance and coldness are followed by emotional dysregulation and hostility that may be poorly matched to the situation.[46,47] A similar pathway may exist for CHR individuals, such that misperceiving others' coldness (e.g., exclusion)[40] or cold-dominance (e.g., hostility)[6] may lead to negative emotional and behavioral responses. While it is necessary to examine such hypotheses with appropriate data (dyadic tasks, longitudinal studies, etc.), the present results illustrate the benefits of using CIIT as a framework for understanding social dysfunction in CHR individuals.

Identifying Individuals with CHR Diagnoses

The present study found CHR individuals differed from individuals with internalizing disorders, including individuals with both an internalizing disorder and elevated psychosis vulnerability or "psychosis-like experiences" (PLEs).[48] Although CHR individuals and individuals with internalizing diagnoses are both low in affiliation, the relatively higher dominance of CHR individuals distinguished these groups. There is some theoretical basis for this finding, in that the rumination and low confidence common to internalizing disorders may drive a behavioral pattern of withdrawal and submissiveness.[23,49,50] Contrasting this with findings from the previous section, it may be that CHR individuals are more confident and assertive than those with only internalizing diagnoses. Such distinctions may have practical significance, in that screening and diagnosing CHR syndromes is time-consuming and our knowledge of factors that differentiate CHR syndromes from similar presentations is limited.[19] Knowing that a clinical group that presents with PLEs can be differentiated from those at actual high risk for psychosis on the basis of interpersonal traits may reduce assessment burden. Future research should use validated IPC measures, establish their predictive value, and explore cut-off scores for diagnostic decisions.

Negative Symptoms, Interpersonal Behavior, and Equifinality

At the symptom-level, the present study found that positive symptoms were related to low affiliation and mostly unrelated to dominance, though individual symptoms varied. Suspiciousness correlated most strongly with a tendency toward low affiliation, which is consistent with the explicitly interpersonal nature of this symptom and previous trait research.[36,40] Similarly, that grandiose ideas positively correlated with dominance is consistent with previous research outside of CHR samples.[36] In contrast, correlations with interpersonal behavior for negative symptoms were quite consistent, relating to low affiliation and submissiveness.

Interestingly, the findings that both negative symptoms and internalizing symptoms are related to disaffiliative and submissive behavior parallels previous research noting the difficulty differentiating primary negative symptoms from secondary negative symptoms (e.g., depression-related).[51] Previous research indicates that distinct cognitive and motivational processes may underlie the apparent similarity of primary and secondary negative symptoms.[52,53] Thus, the similarity observed in the present study might be an example of equifinality, in that CHR individuals with primary negative symptoms and individuals with internalizing diagnoses may report similar interpersonal tendencies, but the processes that lead to this behavior are distinct. Nonetheless, it may be the case that the similarities in surface-level behavior are still important. As noted above, CIIT emphasizes the interactive context of interpersonal behavior, such that a person's behavior influences and predicts their partner's response. Thus, it may be that individuals with negative symptoms and internalizing disorders elicit similar responses from other people and fall into similar interaction patterns, though for different reasons.

Conclusions, Limitations, and Future Directions

The present study advances social functioning research in individuals at risk for psychosis; however, there are limitations worth noting. First, the study did not use a validated IPC measure and thus the present results may lack precision. For instance, the dominance and affiliation composites may not be calibrated precisely as they are in other measures (e.g., dominance at 90 degrees). Nonetheless, considerable previous research supports the general location of extraversion and agreeableness within the IPC, as well as their utility as proxies for dominance and affiliation.[25] Regardless, an important future direction will be to replicate these results with a validated IPC measure.

A second limitation is this study's reliance on cross-sectional self-report measures. Causal conclusions cannot be drawn regarding whether the onset of attenuated positive symptoms led to differences in interpersonal traits or interpersonal traits preceded these symptoms. Additionally, it might be argued that participants lack insight into their actual interpersonal behavior.[54] Although this is possible, there is also evidence to suggest that self-report measures of interpersonal traits do roughly index observed behavior.[55] Regardless, it will be important for future studies to directly assess interpersonal behavior using a variety of timescales. The CIIT literature is particularly well-equipped to provide such methods, in that ecological momentary assessment and laboratory interaction tasks are frequently used, such that future CHR studies can be compared to normative data in the CIIT literature.[10]

Overall, the present study illustrates how CIIT and its central descriptive framework—the IPC—can advance the psychosis risk literature. The IPC differentiated individuals with a CHR diagnosis from healthy controls, as well as a group of clinical controls that share similarities with CHR individuals (i.e., PLEs and distress). Furthermore, the finding that individuals with CHR diagnoses describe themselves as low in affiliation and somewhat dominant, can be immediately connected to an extant literature that details the behavior, traits, social cognition, and interaction styles of others who exhibit this interpersonal style. Although considerable work is needed to advance a theory that connects social cognition, behavior, and outcomes in individuals at-risk for psychosis, the present study offers a theoretical framework and preliminary data to begin this endeavor.

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