**Supplemental Materials**

**Methods**

**Protocol.** Data for the current analyses were provided by children and caregivers as part of their participation in a study of behavioral and physiological correlates of social motivation and reward. Families learned of the study through community postings and involvement with previous and current research. Interested families contacted the lab to complete a screening phone call, and eligible families were then invited to the lab. Informed consent and assent were obtained, and parents completed a questionnaire packet and interview while children completed a brief cognitive assessment, a series of experimental tasks, and self-report measures.

**Measures.** Caregivers provided information regarding children’s social motivation via multiple parent-report measures described below.

**Social Responsiveness Scale, 2nd Edition (SRS-2) Social Motivation subscale** – The SRS-2 (Constantino, 2012) is commonly used in research and clinic settings to assess various facets of social functioning including social motivation. As a whole, the SRS-2 demonstrates very strong internal consistency among items, with alpha values at or above .93 in this age range (Constantino & Gruber, 2012). Among its questions, eleven items referring to one’s interest and tendency to join in social interactions/settings have been identified and affirmed via expert clinician consensus to reflect social motivation (Constantino & Gruber, 2012). Together, they yield a T-score reflecting social motivation *difficulties*, for which higher scores indicate greater difficulties in this domain.

**Dimensions of Mastery Questionnaire, 17th Edition (DMQ)** – The DMQ(Morgan, 1997; Morgan et al., 1997) is a parent-report measure assessing children’s persistence and enjoyment of achievement within various domains of skill. From the DMQ, the score for the subscale *Social Persistence with Adults* was obtained to reflect social motivation with regard to adults, and the score from the subscale Social Persistence with Children to reflect social motivation related to peers. Internal consistency metrics for both scales are acceptable among English-speaking samples (Morgan et al., 2013). The DMQ was originally developed for a broader population of children and adults and has only recently been used with individuals with ASD (e.g., Garman et al., 2016). On both of the subscales used here, higher scores indicate greater social persistence.

**Wing Subgroups Questionnaire (WSQ)** – The WSQ (Castelloe & Dawson, 1993) was developed following hypotheses by Wing and Gould (1979) as described earlier that social behavior may be categorized into one of several styles or profiles. Within the measure, parents read sets of behavioral descriptions and rated the degree to which each description fit their child’s social style. Within each set, descriptions correspond to the social styles identified by Wing and Gould, and parent ratings yield categorical information in the form of a dominant *social style* (appropriate, active, passive, aloof), as well as continuous scores reflecting the frequency or degree to which a child displays each of the four social styles. Although the WSQ was not originally conceptualized explicitly as assessing ‘social motivation’ per se, such motivation is implicit within Wing’s observations and descriptions of social behavior. Note that one participant with ASD is lacking WSQ data.

**Child Behavior Checklist (CBCL) Social Problems subscale** – The CBCL (Achenbach & Rescorla, 2001) is a broad assessment of social/emotional functioning, yielding age- and sex-normed T-scores in a variety of domains. The Social Problems subscale assesses social difficulties demonstrated in everyday life, with higher T-scores reflecting greater difficulties.

**Vineland Adaptive Behavior Scales, 2nd Edition (Vineland-II) – Socialization Standard Score** – The Vineland-II (Sparrow, Cicchetti, & Balla, 2006) is a structured parent interview measuring skills demonstrated independently by a child in daily life. The Socialization subdomain reflects interpersonal, coping, and related skills, with higher scores indicating stronger skills.

**Differential Ability Scales**, **Second Edition** (DAS-II; Elliott, 2007) **Word Definitions** and **Matrices** subtests provided a measure of participants’ verbal and nonverbal skills, respectively. Although brief, both the Word Definitions and Matrices subtests correlate with the General Conceptual Ability of the DAS-II (.76 and .80, respectively). Moreover, each is highly correlated with its respective composite score (Word Definitions correlated at .91 with the DAS-II Verbal Reasoning composite score, Matrices correlated at .90 with the DAS-II Nonverbal Reasoning composite score; Elliott, 2007).

**Results**

**Aim 2. Correspondence among measures of social motivation**

Correlations for TD participants are presented in Table S1. For TD males (above the diagonal in grey), significant correlations were largely limited to the subscales within the WSQ, such that higher ‘appropriate’ ratings were associated with lower ratings on ‘active’, ‘passive’, and ‘aloof’ subscales. A particularly strong negative correlation (*r*=-.832) was observed between ‘appropriate’ and ‘aloof’ behavior styles, such that participants who reportedly displayed high levels of appropriate social behavior also displayed very little aloof behavior. The ‘aloof’ scale was also significantly negatively correlated with persistence with peers (*r*=-.518). As with the combined group, the latter three subscales of the WSQ were all positively correlated with one another at moderate levels (*r*s<.520). In contrast to both the combined sample and the ASD male group, we did not observe correlations between the SRS-2 and our other measures of social motivation.

There were very few significant correlations for TD female participants, but higher ‘passive’ ratings were associated with increased social motivation difficulties, and higher ‘aloof’ ratings corresponded to lower ‘appropriate’ ratings. The apparent dissociation between our measures of social motivation among TD females relative to the other subgroups within our sample (ASD males, TD males) is striking. Although speculative, it may be that other factors (e.g., anxiety, peer influences, family interaction styles) moderate associations between the various social motivation measures included here.

**Aim 3. Correlations between social motivation and social outcomes**

For TD males, social problems were associated with less ‘appropriate’ behavior and more ‘active’ and ‘aloof’ social behavior. Among TD females, no correlations reached the level of statistical significance. See Table 4.

**Supplemental Tables**

**Table S1: Correlations among measures of social motivation for TD males (above diagonal in grey) and TD females (below diagonal)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **SRS-2 Social Motivation** | **DMQ Social Persistence with Adults** | **DMQ Social Persistence with Children** | **WSQ Appropriate** | **WSQ** **Active** | **WSQ****Passive** | **WSQ** **Aloof** |
| **SRS-2 Social Motivation** | . | .028CI: -.44 - .49 | -.213CI: -.62 - .28 | -.040CI: -.50 - .43 | -.008CI: -.47 - .46 | .038CI: -.44 - .50 | .009CI: -.46 - .47 |
| **DMQ Social Persistence with Adults** | .336 CI: -.17 - .70 | . | .343CI: -.15 - .70 | .290CI: -.21 - .67 | -.298CI: -.67 - .20 | -.329CI: -.69 - .16 | -.129CI: -.56 - .36 |
| **DMQ Social Persistence with Children** | -.291 CI: -.68 - .22 | .119CI: -.38 - .57 | . | .363CI: -.13 - .71 | -.396CI: -.73 - .09 | -.212CI: -.62 - .28 | -.518\*CI: -.79 - -.07 |
| **WSQ Appropriate** | -.367CI: -.72 - .12 | .063CI: -.43 - .53 | .209 CI: -.30 - .63 |  . | -.696\*\*CI: -.88 - -.34 | -.645\*\*CI: -.86 - -.26 | -.832\*\*\*CI: -.94 - -.60 |
| **WSQ Active** | -.090CI: -.53 - .39 | -.114CI: -.56 - .39 | -.058CI: -.52 - .43 | -.341CI: -.70 - .15 | .  | .520\*CI: .07 - .79 | .535\*CI: .09 - .80 |
| **WSQ Passive** |  .472\*CI: .01 - .77 | .034 CI: -.45 - .51 | .069CI: -.43 - .53 | -.428CI: -.75 - .05 | .024CI: -.45 - .49 | .  | .607\*\*CI: .20 - .84 |
| **WSQ Aloof** | .153CI: -.34 - .58 | -.102 CI: -.56 - .40 | -.176CI: -.61 - .33 | -.793\*\*\*CI: -.92 - -.52 | .324CI: -.17 - .69 | .268CI: -.23 - .65 | .  |

Notes: \**p*<.05. \*\**p*<.01. \*\*\**p*<.001. SRS-2 – Social Responsiveness Scale, 2nd Edition (Constantino, 2012). DMQ – Dimensions of Mastery Questionnaire, 17th Edition (Morgan, Busch-Rossnagel, Barrett, & Wang, 1997). WSQ – Wing Subgroups Questionnaire (Castelloe & Dawson, 1993). CI – 95% confidence interval.

**Table S2: Correlations between social motivation and social outcomes for TD males and TD females**

|  |  |  |
| --- | --- | --- |
|  | **TD Males** | **TD Females** |
|  | **Vineland-II Socialization** | **CBCL****Social Problems** | **Vineland-II Socialization** | **CBCL** **Social Problems** |
| **SRS-2 Social Motivation** | -.138 | .06 | -.111 | .087 |
| **DMQ Social Persistence with Adults** |  .428 | -.129 | -.137 | .121 |
| **DMQ Social Persistence with Children** | .129 | -.282 | .047 | -.262 |
| **WSQ Appropriate** | .032 | -.553\* | .241 | -.119 |
| **WSQ Active** | -.278 | .746\*\*\* | -.325 | .215 |
| **WSQ Passive** | -.258 | .378 | -.126 | -.157 |
| **WSQ Aloof** | .057 | .474\* | -.108 | -.002 |

Notes: \**p*<.05. \*\**p*<.01. \*\*\**p*<.001. SRS-2 – Social Responsiveness Scale, 2nd Edition (Constantino, 2012). DMQ – Dimensions of Mastery Questionnaire, 17th Edition (Morgan, Busch-Rossnagel, Barrett, & Wang, 1997). WSQ – Wing Subgroups Questionnaire (Castelloe & Dawson, 1993). Vineland-II – Vineland Adaptive Behavior Scales, 2nd Edition (Sparrow, Cicchetti, & Balla, 2006). CBCL – Child Behavior Checklist (Achenbach & Rescorla, 2001).