Brief Report: The Application of Skills and Knowledge (ASK) model: A novel conceptualization of social performance to guide instrument development and advance adult autism research

Vanessa H. Bal,¹ Somer Bishop,² Sigan Hartley,³ Julie Lounds Taylor,⁴ Alexandra Sturm⁵

¹Graduate School of Applied and Professional Psychology, Rutgers University – New Brunswick, Piscataway, NJ

²University of California San Francisco Department of Psychiatry, San Francisco, CA

³Waisman Center and School of Human Ecology, University of Wisconsin-Madison, Madison, WI

⁴Vanderbilt Kennedy Center, Vanderbilt University, Nashville, TN

⁵Jane and Terry Semel Institute for Neuroscience and Human Behavior, University of California, Los Angeles (UCLA), Los Angeles, CA

Corresponding Author

Vanessa H. Bal, Graduate School of Applied and Professional Psychology; Rutgers University – New Brunswick, 604 Allison Road, Piscataway, NJ 08854.

Email: Vanessa.Bal@rutgers.edu

Declaration of conflicting interests

The authors declare that there is no conflict of interests.

Acknowledgements

The authors thank Ellen Wilkinson and Macy Turley for their assistance in preparing this manuscript.

Funding

This research was supported by the National Institute of Mental Health (K23MH115166 to Dr. Bal), the National Institute of Child Health and Human Development (R01HD093012 to Dr. Bishop and U54HD090256 to Dr. Q. Chang), FAR Fund (Dr. Taylor) and the Health Resources and Services Administration (R41MC33087-01-00 to Dr. Sturm).

Abstract

Current conceptualizations of social competency often focus on value judgments (e.g., appropriateness) that are influenced by a combination of individual and environmental factors, such as a social partner's understanding of autism. We posit that social performance is an understudied, but critical contributor to adult social functioning and present the Application of Skills and Knowledge (ASK) model to stimulate research in this area. The ASK model aims to separate social performance from other factors that may promote or adversely impact social functioning, therefore allowing for identification of treatment targets that do not solely rest on the individual. This framework can be used to accelerate future instrument and intervention development efforts to support well-being and community participation for autistic adults.

Short Report: The Application of Skills and Knowledge (ASK) model: A novel conceptualization of social performance to guide instrument development and advance adult autism research

Studies of autistic adults often present a bleak picture, reporting low rates of competitive employment, limited independent living skills, few social opportunities (Howlin & Magiati, 2017) and high rates of depression and anxiety (Hollocks et al., 2019). Broadly defined social abilities are a key predictor of employment outcomes (Scott et al. 2019) and quality of life (DaWalt et al., 2019). Autistic adults' perceptions of acceptance and experiences of camouflaging have been associated with depression and stress (Cage et al., 2018). Although many adults on the spectrum experience social difficulties in a range of contexts, a review of psychosocial interventions targeting social functioning in autistic adults yielded only 41 peer-reviewed studies published in the past 37 years (Pallathra et al., 2019). Considering that social abilities play a crucial role in the successful navigation of adult life, the dearth of empirically-validated interventions to promote adult social functioning is a serious problem.

A major impediment to development and implementation of effective social functioning interventions is a fundamental lack of knowledge of the components that underlie successful social interactions across contexts. There is a resulting dearth of instruments designed to systematically assess adult strengths and challenges in the social arena, or to measure changes in social functioning over time. In turn, the unavailability of valid outcome measures prevents evaluation of novel and potentially efficacious interventions that are desperately needed to support social functioning in autistic adults.

In this brief report, we propose a novel conceptualization of social performance, which is intended to stimulate development of instruments needed to advance adult autism research, as well as interventions that will directly facilitate community engagement for autistic adults. The *Application of Skills and Knowledge* (ASK) model focuses on observable, potentially malleable components that contribute to positive social interactions. Recent studies engaging stakeholders have highlighted barriers to successful community engagement for autistic adults, ranging from a lack of skills or knowledge required to navigate social interactions in different contexts, to difficulties applying knowledge in real-life situations (e.g., Ncube et al., 2019). Building off this research and theories of social competence (Rose-

Krasnor, 1997), we posit that social performance is an essential feature of adult social functioning that has been drastically understudied. By considering skills, knowledge and application as distinct components of social performance (Figure 1), this model provides a conceptual framework for assessing the specific strengths or difficulties impeding successful social performance that could be intervention targets and can inform sequencing of treatment. Acknowledging the complex, multifaceted nature of social functioning and in line with the biopsychosocial perspective of the International Classification of Functioning, Disability and Health (ICF), we conceptualize social performance as a critical dimension that, together with individual (e.g., intellectual level, mental health, motivation to socialize) and environmental factors (e.g., coworker understanding of ASD), provides a foundation for social functioning (Figure 2).

[Insert Figures 1 & 2]

Differentiating Social Performance from Social Competence

Theoretical models of social competence provide useful frameworks to consider individual abilities in the context of complex social transactions. Many models define social competence as the extent to which the individual appropriately or effectively employs behaviors in social interactions (e.g., Rose-Krasnor, 1997). These models have been considered in children with ASD (e.g., Odom & McConnel, 1985). Currently available measures of social competence, however, tend to quantify broadly defined events (e.g., counts of “positive” interactions), subjective judgments of “likability”, or quality of social interaction (e.g., converses “appropriately”). These ratings may be influenced by factors unrelated to the individual’s social performance (e.g., social partner’s acceptance of ASD), and tend to assume that poor application signals a deficit in skill or knowledge. Negative peer impressions may reduce opportunities for interactions to occur in the first place (Sasson et al., 2017). Thus, measures that focus solely on the occurrence of “successful” interactions cannot tease apart an impairment in social performance from other individual or environmental factors. Moreover, currently available measures of social competence do not adequately differentiate between different reasons for poor performance (e.g., the lack of skill or knowledge vs. difficulties with timing, fluency, flexibility of application). For

example, even when autistic adults have requisite knowledge or skills, they may still have difficulty implementing this knowledge and skills in real-world interactions (Ncube et al., 2019). The resulting impairment may be alleviated or exacerbated by the supports in place in that environment.

Recent developments in conceptualization and measurement of adult social function

Yager and colleagues recently developed the Multidimensional Social Competence Scale (MSCS), a parent-report instrument designed to capture behaviors important to peer acceptance and development of close friendships in autistic adolescents. A self-report version tested in a normative sample of college students (Trevisan et al., 2018) supported seven domains of social competence that were organized into two broader domains. The first domain comprised social motivation, empathic concern and nonverbal conversation skills (e.g., facial expressions), and the second domain encompassed social inferencing, social knowledge, verbal conversation skills and emotion regulation. Although the MSCS shows promise for helping to parse out different aspects of social functioning, items do not clearly differentiate whether a deficit is due to a lack of skill, knowledge, and/or other factor that impedes application of skills or knowledge. This version has not yet been validated in autistic adults; research is needed to examine whether items derived for use with adolescence capture components critical to successful participation across adult contexts.

Pallathra and colleagues (2018) proposed four behavioral components underlying adult social functioning in autistic adults: motivation, anxiety, cognition and skills. This model is compelling because it focuses on domains that could be targeted in intervention. While Pallathra suggested a focus on increasing social motivation may be especially important for future intervention research, the multifaceted nature of social motivation, including a combination of skills (e.g., attending to social stimuli), behaviors (e.g., seeking interaction) and preferences (e.g., pleasure in interaction) (Chevallier, et al., 2012), warrants further study. In particular, it will be important that measures differentiate between skills and behaviors (i.e., application of skills) and capture the idiosyncratic ways that autistic individuals may show social interest (Jaswal & Akhtar, 2019). Additionally, respecting individual differences in social preferences and recognizing that, while they may affect some aspects of social functioning, such as the quantity or

frequency of social contacts, certain aspects of social motivation may not be necessary for successful social functioning across all contexts, such as the workplace.

ASK Model of Social Performance

Informed by literature review, existing instruments, and collective experience, a conceptual model of Social Performance is presented in Figure 1. The ASK model was developed specifically with adults with ASD in mind, but will likely be applicable to adults with other intellectual and developmental disabilities. Social performance is conceptualized as relying on social *skills*, social *knowledge* and *application* of skills and knowledge. The model acknowledges that all three components are required to successfully navigate social activities (e.g., conversation, job interview). These components are further broken down into factors and facets relevant to each component. The examples included in Figure 1 are demonstrative and intended to stimulate clinical research that will directly inform development of interventions for adults. Mixed-method approaches will be required to empirically derive the actual content.

Knowledge reflects the understanding of rules that dictate behavior in different environmental and relational contexts. It includes awareness that rules are not absolute, and therefore expectations will vary depending on the context and nature of the relationship. Knowledge encompasses awareness and some level of understanding of rules and expectations, but would not require that the individual agrees with these rules or expectations, or even modifies behavior according to this knowledge, as those are captured under application.

Skills include both cognitive processes (e.g., recognition) and behavioral actions. Possible facets include the recognition of nonverbal cues and intentions of others, as well as abilities to initiate, respond to and maintain reciprocal interchanges. Some have referred to these cognitive processes (e.g., face processing; theory of mind) as social cognition (Corbett et al., 2016). Simply having these skills (e.g., ability to recognize facial emotion) is not sufficient to produce appropriate social behavior and requires additional processing (e.g., contextual cues, inferences) of information about that situation. Thus, we use the term

skill to emphasize the demonstrated ability to perform a behavior (e.g., infer others' thoughts), while distinguishing the reasoning required to apply that skill appropriately as a facet of application.

Application is supported by the integration of skills and knowledge in different interactions, including everyday (expected) and uncommon (anomalous or unexpected) situations. Reasoning relies on understanding of timing and behavioral flexibility (e.g., ability to ignore a rule violation or violate a rule if situation requires it). Importantly, this subdomain is not intended to reflect judgements of how well skills and knowledge are applied (i.e., social competence; e.g., “asks questions at inappropriate times”), but the factors that impede or facilitate use of the skills and knowledge in social activities (“considers circumstances [e.g., what the other person is doing] when asking a question”).

Social interactions are ubiquitous throughout adulthood and successful navigation is critical to initiation and maintenance of healthy relationships and community participation. Not having *knowledge* of the rules that govern interactions in a given context, lacking *skills* to interact according to those rules, or difficulty *applying* knowledge to deliver skills in a flexible, timely manner can negatively impact social interaction or preclude the initiation of interactions altogether. Some social activities, such as job interviews, act as gatekeepers to community participation. Even seemingly mundane interactions, such as greeting neighbors in passing, can affect first impressions, development of relationships and integration into society (Sasson et al., 2017). While children may be “forgiven” for missteps, social expectations are higher for adults (Pallathra et al., 2019). Thus, poor social performance can have a cascading effect on social functioning throughout the lifespan.

While the three domains of social performance are thought to affect social functioning across contexts, this model can also serve as a framework for understanding which components are essential in specific contexts (e.g., workplace). Individual and environmental factors are also important contributors to social functioning (Figure 2) and may serve as moderators of social performance's influence on broader social functioning. Thus, understanding components of social performance can provide insight into how these moderators facilitate community involvement, which is essential for our understanding of person-environment fit and where to focus supports and how to sequence treatments. It is important to

recognize that social performance may sometimes reflect conscious attempts (i.e., “camouflaging”) by an individual to engage in a particular way, which can have detrimental effects on mental health (e.g., Cage et al., 2018). In such cases, consideration of social performance may help to identify environmental factors as a target for intervention (e.g., autism education or acceptance in that setting), rather than the individual. Inconsistent profiles of social performance across contexts may also signal the need to focus more on environmental changes or consideration of the appropriateness of intervention (e.g., if an individual is not motivated to engage in a specific context).

Future directions

The ASK conceptual model was developed to advance measurement and intervention research aimed at supporting positive social functioning in autistic adults. Moving forward, systematic research will need to start “from the ground up,” rather than relying on existing child-focused tools that miss the unique needs of adults due to inherent limitations in developmental scope. To begin, we openly acknowledge that this model was conceptualized based on collective clinical experiences of clinicians and researchers; therefore, an essential next step is to partner with stakeholders to gain perspectives on the essential factors/facets of social performance that affect daily functioning. Ideally, collaborative efforts will lead to development of item sets that could be tested across multiple sites in different settings (e.g., work, community) to inform development of change-sensitive measures.

Conclusions

Studies suggest social knowledge and skills can be acquired through intervention (Pallathra et al., 2019) or explicit efforts to “study” and consciously monitor social behavior (Hull et al., 2017). Much less is known about the facets of application that facilitate or impede social functioning. At present, research in this area is stymied by a lack of systematic methods to parse the relative strengths and weaknesses in skills, knowledge, and application necessary to inform targeted intervention. With few options to measure distinct skills, knowledge or application relevant to adult contexts, particularly work or postsecondary education, we likely miss key promoters of success and important areas for intervention and support. A measure designed to capture social performance that can be used across adult contexts will increase

scientific rigor of adult ASD research, including clinical trials of interventions targeting social functioning. Considering incremental units that make up each subdomain in the model will ensure that the instrument is sensitive to individual change. This more nuanced understanding of the components of social performance that promote or impair social functioning in autistic adults will propel adult research forward and foster the development of supports to enhance community participation and well-being.

References

- Corbett, B. A., Key, A. P., Qualls, L., Fecteau, S., Newsom, C., Coke, C., & Yoder, P. (2016). Improvement in Social Competence Using a Randomized Trial of a Theatre Intervention for Children with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, 46(2), 658–672. <https://doi.org/10.1007/s10803-015-2600-9>
- DaWalt, L. S., Usher, L. V., Greenberg, J. S., & Mailick, M. R. (2019). Friendships and social participation as markers of quality of life of adolescents and adults with fragile X syndrome and autism. *Autism*, 23(2), 383–393. <https://doi.org/10.1177/1362361317709202>
- Hull, L., Petrides, K. V., Allison, C., Smith, P., Baron-Cohen, S., Lai, M.-C., & Mandy, W. (2017). “Putting on My Best Normal”: Social Camouflaging in Adults with Autism Spectrum Conditions. *Journal of Autism and Developmental Disorders*, 47(8), 2519–2534. <https://doi.org/10.1007/s10803-017-3166-5>
- Jaswal, V. K., & Akhtar, N. (2019). Being versus appearing socially uninterested: Challenging assumptions about social motivation in autism. *Behavioral and Brain Sciences*, 42, e82. <https://doi.org/10.1017/S0140525X18001826>
- Howlin, P., & Magiati, I. (2017). Autism spectrum disorder: Outcomes in adulthood. *Current Opinion in Psychiatry*, 30(2), 69–76. doi: 10.1097/ycp.0000000000000308
- Kapp, Steven K. 2018. “Social Support, Well-Being, and Quality of Life Among Individuals on the Autism Spectrum.” *Pediatrics* 141(Supplement 4):S362–68.
- Ncube, B. L., Shaikh, K. T., Ames, M. E., McMorris, C. A., & Bebeko, J. M. (2019). Social Support in Postsecondary Students with Autism Spectrum Disorder. *International Journal of Mental Health and Addiction*, 17(3), 573–584. <https://doi.org/10.1007/s11469-018-9972-y>
- Odom, S. L., & McConnell, S. R. (1985). A Performance-based Conceptualization of Social Competence of Handicapped Preschool Children: Implications for Assessment. *Topics in Early Childhood Special Education*, 4(4), 1–19. <https://doi.org/10.1177/027112148500400403>

- Pallathra, A. A., Calkins, M. E., Parish-Morris, J., Maddox, B. B., Perez, L. S., Miller, J., Gur, R. C., Mandell, D. S., Schultz, R. T., & Brodtkin, E. S. (2018). Defining behavioral components of social functioning in adults with autism spectrum disorder as targets for treatment: Components of social functioning in adult ASD. *Autism Research, 11*(3), 488–502. <https://doi.org/10.1002/aur.1910>
- Pallathra, A. A., Cordero, L., Wong, K., & Brodtkin, E. S. (2019). Psychosocial Interventions Targeting Social Functioning in Adults on the Autism Spectrum: A Literature Review. *Current Psychiatry Reports, 21*(1), 5. <https://doi.org/10.1007/s11920-019-0989-0>
- Rose-Krasnor, L. (1997). The Nature of Social Competence: A Theoretical Review. *Social Development, 6*(1), 111–135. <https://doi.org/10.1111/j.1467-9507.1997.tb00097.x>
- Sasson, N. J., Faso, D. J., Nugent, J., Lovell, S., Kennedy, D. P., & Grossman, R. B. (2017). Neurotypical Peers are Less Willing to Interact with Those with Autism based on Thin Slice Judgments. *Scientific Reports, 7*(1), 40700. <https://doi.org/10.1038/srep40700>
- Scott, M., Milbourn, B., Falkmer, M., Black, M., Bölte, S., Halladay, A., Lerner, M., Taylor, J. L., & Girdler, S. (2019). Factors impacting employment for people with autism spectrum disorder: A scoping review. *Autism, 23*(4), 869–901. <https://doi.org/10.1177/1362361318787789>
- Taylor, J. L., & Seltzer, M. M. (2010). Changes in the Autism Behavioral Phenotype During the Transition to Adulthood. *Journal of Autism and Developmental Disorders, 40*(12), 1431–1446. <https://doi.org/10.1007/s10803-010-1005-z>
- Trevisan, D. A., Tafreshi, D., Slaney, K. L., Yager, J., & Iarocci, G. (2018). A psychometric evaluation of the Multidimensional Social Competence Scale (MSCS) for young adults. *PLOS ONE, 13*(11). <https://doi.org/10.1371/journal.pone.0206800>

Figure 1. Conceptual model of social performance.

Figure 2. Social Performance is one critical component that supports social functioning. Social performance + other individual factors (e.g., motivation) + other environmental factors (e.g., social partner's knowledge or acceptance of ASD) provide a foundation for social functioning.