A Paradigm for Understanding Adolescent Social Anxiety with Unfamiliar Peers:

Conceptual Foundations and Directions for Future Research

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Abstract

Adolescents who experience social anxiety concerns often display symptoms and impairments when interacting with unfamiliar peers. For adolescent clients, reducing symptoms and impairments within these interactions comprises a key treatment target within exposure-based therapies for social anxiety. Recent work on mechanisms of change in exposure-based therapies highlights the need for therapeutic exposures to simulate real world manifestations of anxiety-provoking social situations. Yet, researchers encounter difficulty with gathering ecologically valid data about social interactions with unfamiliar peers. The lack of these data inhibits building an evidence base for understanding, assessing, and treating adolescent clients whose concerns manifest within these social interactions. Consequently, we developed a paradigm for understanding adolescent social anxiety within social interactions with unfamiliar peers. In this paradigm, we train peer confederates to interact with adolescents as if they were a same-age peer, within a battery of social interaction tasks that mimic key characteristics of therapeutic exposures. Leveraging experimental psychopathology and multi-modal assessment approaches, this paradigm allows for understanding core components of social interactions with unfamiliar peers relevant to exposure-based therapy, including stimuli variability, habituation, expectancy violations, peers' impressions about socially anxious adolescents, and maladaptive coping strategies that inhibit learning from exposures (e.g., safety behaviors). We detail the conceptual and empirical foundations of this paradigm, highlight important directions for future research, and report "proof of concept" data supporting these research directions. The Unfamiliar Peer Paradigm opens new doors for building a basic science that informs evidence-based services for social anxiety, within clinically-relevant contexts in adolescents' social worlds.

Keywords: adolescent; assessment; social interactions; social anxiety; unfamiliar peers

Social anxiety is characterized by fear and avoidance of social interactions, particularly among unfamiliar individuals (American Psychiatric Association [APA], 2013). Those who experience social anxiety also experience profound impairments in social functioning, including difficulties with social relationships, as well as work and school performance (Stein & Kean, 2000). When left untreated, social anxiety often portends the development of additional mental health concerns, including major depression and substance use and abuse (e.g., Grant et al., 2005; Kessler et al., 2005; Kessler et al., 2012; Dryman et al., 2016). Social anxiety is not only one of the most prevalent mental health concerns, it also most commonly emerges during or before the adolescent period (e.g., Kessler et al., 2005; Mash & Barkley, 2014). Thus, adolescence is a key period in which to innovate approaches for assessing and understanding social anxiety (Garcia-Lopez, Salvador, & De Los Reyes, 2015; Deros et al., 2018).

When assessing social anxiety, a crucial element involves detecting symptoms as they manifest within the specific contexts where clients experience impaired functioning (Beidel, Rao, Scharfstein, Wong, & Alfano, 2010; Bögels et al., 2010). Indeed, not all clients experience social anxiety in the same way and within the same contexts. In line with this notion, adolescent clients vary considerably in the contexts in which their social anxiety concerns manifest (Alfano & Beidel, 2011; Raggi, Samson, Felton, Loffredo, & Berghorst, 2018). In particular, adolescent clients encounter elevated levels of distress within social situations with unfamiliar peers, such as unstructured situations with unclear expectations for social engagement (e.g., parties and other social events; Glenn et al., 2019; Hofmann et al., 1999). More broadly, perhaps the most robust finding in the developmental psychopathology literature involves the impact of same-age peers on adolescent development (e.g., Ingersoll, 1989; La Greca & Lopez, 1998; Prinstein, 2017; Prinstein & Giletta, 2016; Rudolph, 2014). In fact, adolescents' exposures to aversive

experiences with same-age peers factor prominently in the development and maintenance of

social anxiety and a host of other mental health concerns (e.g., attention-deficit/hyperactivity

disorder, conduct problems, depression, suicide; Epkins & Heckler, 2011; Jarrett & Ollendick,

2008; Miller & Prinstein, 2019; Prinstein et al., 2018; Prinstein & Dodge, 2008). Thus,

assessments designed to detect adolescent clients' social anxiety concerns and facilitate planning

treatment must quantify concerns within the contexts in which they may benefit from care.

The need for context-sensitive assessment approaches dovetails with emerging work on

mechanisms of change in exposure-based therapies for anxiety (Craske, Treanor, Conway,

Zbozinek, & Vervliet, 2014). Broadly, this work calls for increased attention to matters relevant

to ensuring that exposures conducted within therapy validly reflect the contexts within which

clients encounter distress (Mystkowski, Craske, & Echiverri, 2002). In this way, exposures

conducted within therapy need to anticipate elements of clients' social environments outside of

therapy—and their reactions to these environments—that might inhibit treatment response and/or

the maintenance of treatment gains. For instance, exposure-based therapies have long been

thought to yield positive benefits for clients primarily by demonstrating to them—through

repeated exposures designed to elicit distress related to anxiety-provoking stimuli (e.g., asking

directions from strangers)—that they eventually *habituate* to the stimuli that provoke their

anxiety (i.e., distress gradually decreases during exposures; Raggi et al., 2018). Recent work

finds that, in addition to habituation, therapeutic exposures need to test clients' *expectancies*

about the stimuli that provoke their anxiety (Sewart & Craske, 2020). For example, if an

adolescent client believes a same-age peer with whom they would like to be friends will ignore

them every time they say "hello," then exposures designed to reduce social anxiety in these

situations should allow the client to test that belief. Needless to say, expectancies for social

contexts may vary considerably depending on the client and the contexts within which they encounter distress. Thus, effectively infusing exposures with opportunities for an adolescent client to experience habituation and learn from expectancy violations hinges on tailoring exposures to the goals of therapy and the client's developmental level (Alfano & Beidel, 2011).

A key aim of this paper is to describe a paradigm designed to improve our understanding of mechanisms of change in exposure-based therapies with adolescents. Specifically, the paradigm we describe focuses on social interactions with unfamiliar peers, a social context germane to treating adolescent social anxiety that has been historically under-represented in research on assessing and understanding the condition. To be clear, current evidence-based approaches to assessing adolescent social anxiety arguably highlight some of the contexts in which adolescent clients experience concerns (e.g., Bögels et al., 2010). For example, diagnostic definitions of social anxiety disorder account for social context to some degree, most notably a subtype of the diagnosis focused on symptoms and impairments that manifest specifically within performance-based contexts like speech-giving (APA, 2013). Consequently, a key component of best practices for evidence-based assessments of adolescent social anxiety involves gathering data from multiple assessment modalities to characterize adolescents' concerns, plan treatment, and monitor treatment response (De Los Reyes, Thomas, Goodman, & Kundey, 2013; Silverman & Ollendick, 2005). Two assessment modalities often factor prominently in current evidence-based assessments of adolescent social anxiety. First, adolescent self-reports of social anxiety play an integral role in all elements of care, including characterizing or diagnosing adolescents' concerns, planning treatment, monitoring treatment response, and identifying evidence-based techniques for treating the condition (De Los Reyes & Makol, 2019). Second, as mentioned previously, adolescents may vary considerably in the social contexts in which they display social

anxiety concerns. Further, the social contexts within which adolescents might display social anxiety concerns, by definition, include interactions with other people. Recent work indicates that the impressions that socially anxious individuals make on others may profoundly impact their ability to form adaptive social bonds and thus reduce impairments stemming from their concerns (for a review, see Piccirillo, Dryman, & Heimberg, 2016). Thus, assessments should incorporate data from a second set of informants beyond adolescent self-reports, namely *observers* or information sources with direct access to observing adolescents within the social contexts in which their concerns manifest. In particular, researchers as well as mental health providers often collect social anxiety reports from significant others in adolescents' lives (Hunsley & Mash, 2007). For assessments of social anxiety and a host of other mental health domains (e.g., generalized anxiety, depression, conduct problems, attention and hyperactivity), parents serve as core informants in that they provide crucial information that informs clinical work with adolescents (De Los Reyes et al., 2015). This is not surprising given that parents are often key stakeholders who seek out care for adolescents' concerns (e.g., Hunsley & Lee, 2014). Additionally, parents commonly report about adolescent social anxiety for the purpose of monitoring treatment response (Weisz, Jensen Doss, & Hawley, 2005), and provide incrementally valuable information about adolescent social anxiety, relative to other informants (e.g., adolescent self-reports and teacher reports; for a review, see Silverman & Ollendick, 2005).

In sum, evidence-based assessment research supports the use of reports taken from both adolescents and parents to measure adolescent social anxiety. Yet, two key factors support the notion that these assessment modalities provide incomplete data for understanding adolescents' concerns, and in particular those stemming from interactions with unfamiliar peers. First, adolescence is a developmental period typified by less time spent in the home context relative to

earlier developmental periods (Ingersoll, 1989). Relative to children from earlier developmental periods, parents tend to have reduced understanding or knowledge of their adolescent's whereabouts, activities, and relationships with same-age peers (Smetana, 2008). As mentioned previously, adolescents' social anxiety concerns often manifest within interactions with unfamiliar peers, and these concerns often drive adolescent clients' needs for care (Hofmann et al., 1999). Further, parent reports of adolescent social anxiety and related domains (e.g., fears of negative and positive evaluation; safety-seeking behaviors) often fail to predict adolescents' perceived experiences in interactions with unfamiliar peers (Deros et al., 2018; Karp et al., 2018; Qasmieh et al., 2018). Coupled with evidence cited previously about the importance of considering observers' impressions of adolescent social anxiety (Piccirillo et al., 2016), the extant data indicate that parents cannot provide a complete account of how key observers in adolescent clients' lives perceive their social anxiety concerns.

Second, an emerging body of work highlights reasons why the main assessment modalities used in evidence-based assessments of adolescent social anxiety—parent reports and adolescent self-reports—cannot sufficiently characterize adolescents' concerns in a way that maximally informs our understanding of mechanisms of change in exposure-based therapies. Specifically, when compared, parent and adolescent reports yield discrepant estimates of social anxiety (for a review, see Achenbach, 2017). For example, in a clinical assessment, the parent might report significantly higher levels of social anxiety symptoms relative to the adolescent's self-reported symptoms (De Los Reyes et al., 2012). These *informant discrepancies* occur across assessment contexts (e.g., outpatient clinics, inpatient settings, schools), reasons for assessment (e.g., diagnosis and referral, treatment planning, treatment outcome), cultures, and measurement modalities (e.g., De Los Reyes et al., 2015, 2019a; Rescorla et al., 2017). Consequently,

informant discrepancies often have significant cascading effects on multiple stages of treatment.

For instance, parents and children/adolescents often hold discrepant views on mental health

domains to target in treatment (e.g., internalizing vs. externalizing concerns, depression vs.

anxiety; Yeh & Weisz, 2001). These informant discrepancies create considerable uncertainties

for decision-making surrounding treatment planning, including how to structure specific aspects

of treatment (e.g., exposures that focus on speech-giving vs. parties; Hawley & Weisz, 2003;

Hoffman & Chu, 2015). Further, informant discrepancies may serve as markers of poor treatment

response (e.g., Becker-Haimes, Jensen-Doss, Birmaher, Kendall, & Ginsburg, 2018).

With regard to social anxiety, if an adolescent client's self-report disagrees with their

parent's report, an assessor might see this as reflecting a core feature of the adolescent's social

anxiety—essentially not wanting to "look bad" during the evaluation—and thus a sound rationale

for downplaying the utility of the client's self-report (see also Deros et al., 2018; DiBartolo et al.,

1998). Not surprisingly then, when confronted with clinical assessments that yield discrepant

reports from parents and children/adolescents, assessors often make judgments that most closely

align with parent reports (e.g., Brown-Jacobsen, Wallace, & Whiteside, 2011; De Los Reyes,

Alfano, & Beidel, 2011; Grills & Ollendick, 2003; Hawley & Weisz, 2003; Youngstrom,

Findling, & Calabrese, 2004). Importantly, assessors make these differential judgments in favor

of parent reports without a compelling evidentiary basis. That is, assessors lack any strong,

definitive data to support the idea that parents provide "more valid" information about adolescent

social anxiety, relative to adolescent self-reports. Assessment factors prominently in constructing

therapeutic exposures, insofar as a key principle underlying exposures involves using the best

available data to tailor exposures to address clients' specific areas of concern (e.g., Alfano &

Beidel, 2011; Raggi et al., 2018; Sewart & Craske, 2020). This principle holds not only for

constructing exposures for the purposes of service delivery, but also for research designed to

address basic questions on how exposures facilitate therapeutic change. Thus, if adolescents'

concerns require exposures focused on interactions with unfamiliar peers, then relying *only* on

the reports of parents and adolescents in evidence-based assessments for adolescent social

anxiety likely results in suboptimal data for decision-making in both research and service

delivery settings.

An additional information source focused squarely on providing valid information about

adolescents' experiences with unfamiliar peers might greatly inform research on mechanisms of

change in exposure-based therapies for adolescent social anxiety. Why do we lack assessment

technologies for gathering these crucial data? Indeed, it may seem straight-forward to solicit

reports from an adolescent clients' peers. Yet, this approach poses challenges due to ethical

concerns (i.e., seeking out parental consent to collect peer reports; Card & Hodges, 2008), and

because the kinds of peers who might be available to provide reports (e.g., close friends) would

be *familiar*, not unfamiliar, to the adolescent. By definition, these reports would yield inaccurate

data about unfamiliar peers' impressions of the adolescents being assessed. Additionally, the

most psychometrically sound approaches for gathering reports about peer

functioning—nominations from familiar peers and naturalistic observations (Prinstein,

2007)—either involve collecting reports from those who know the adolescent they are rating, or

leverage approaches that lack feasibility for assessing individual adolescents (i.e., for the

purposes of constructing tailored exposures). Even if it were possible for an assessor to solicit

reports directly from same-age unfamiliar peers, such an approach might also lack feasibility,

particularly within geographic locales with low population density (i.e., difficulty recruiting

same-age peers who are unfamiliar to the client). Thus, we require a psychometrically sound assessment paradigm that does not infringe on clients' confidentiality.

One approach might involve bringing unfamiliar peers to the adolescent, rather than soliciting unfamiliar peers from the adolescent's social environment. In fact, work in the fields of clinical psychology, developmental psychopathology, and social and personality psychology provide a firm conceptual and empirical foundation for the development of a research paradigm for gathering these data. Specifically, prior work from our own team (Glenn et al., 2019) and independent teams (Anderson & Hope, 2009) has involved recruiting youthful-appearing undergraduate and post-baccalaureate research personnel to "stand in" as unfamiliar peers (i.e., *unfamiliar peer confederates*). Using these peer confederates, research teams have created a battery of social interaction tasks of approximately 20-minutes in duration, designed to mimic everyday social interactions between adolescent research participants and unfamiliar peers (Anderson & Hope, 2009; Deros et al., 2018). Interestingly, our innovative use of this *Unfamiliar Peer Paradigm* involves tasking these peer confederates with providing reports about adolescent social anxiety following their 20-minute observations of the adolescent. These peer confederates receive no training to provide reports beyond those provided to other collateral informants such as parents; in this respect, peer confederates provide reports as naïve, untrained raters (Deros et al., 2018). In support of this approach, a robust line of research suggests that people can provide psychometrically sound reports of others' psychological states (e.g., personality) based on relatively brief interactions (e.g., thin slice judgments; Ambady & Rosenthal, 1992; Funder & Colvin, 1988). Beyond peer confederates' reports, we describe multiple modalities one can use to assess adolescents' reactions to the Unfamiliar Peer Paradigm, including adolescents' self-perceptions and those of trained observers. Thus, peer confederates'

reports, coupled with an array of multi-modal data, allow the Unfamiliar Peer Paradigm to contribute to a holistic assessment of social anxiety within interactions with unfamiliar peers.

Conceptual and empirical foundations of the Unfamiliar Peer Paradigm can also be found in exposure-based therapies. In fact, the paradigm consists of a developmentally adapted set of tasks originally designed to assess treatment response in exposure-based therapies for adulthood social anxiety (e.g., Beidel et al., 2010). In essence, the paradigm functions as a standardized set of short, developmentally appropriate exposures designed to extract psychometrically sound data about adolescents' social anxiety concerns when displayed in interactions with unfamiliar peers. As such, in this review we highlight important directions for basic research on treating adolescent social anxiety, with an emphasis on areas of work relevant to understanding mechanisms of change in exposure-based therapies with adolescents. Using a well-characterized sample of adolescents who completed the Unfamiliar Peer Paradigm, we report important "proof of concept" data supporting each direction we highlight for future research.

Purpose of This Paper

The purpose of this paper is to describe recent work seeking to improve the precision and accuracy of evidence-based assessments of adolescent social anxiety. Specifically, the Unfamiliar Peer Paradigm focuses on an important social context to consider when treating adolescent social anxiety that has received relatively little attention in research on assessing the condition. In turn, we describe how this paradigm may facilitate innovative research on mechanisms of change in exposure-based therapies for adolescent social anxiety. We address several broad aims: (1) detail the conceptual and empirical foundations of the Unfamiliar Peer Paradigm; (2) describe the specific procedures underlying the Unfamiliar Peer Paradigm; (3)

review empirical support for the paradigm; and (4) highlight directions for future research and report "proof of concept" data supporting these research directions.

Conceptual and Empirical Foundations of the Unfamiliar Peer Paradigm

The Unfamiliar Peer Paradigm sits on firm conceptual and empirical foundations stemming from two robust areas of work. In Figure 1, we graphically depict these conceptual and empirical foundations. First, the paradigm requires participants to engage in a counterbalanced series of brief social interactions that socially anxious adolescents often perceive as distressing. Thus, these standardized exposures elicit real world adolescent behavior to aid in our understanding of core processes underlying exposure-based therapies with adolescents. Second, the ability to observe these processes is valuable insofar as adolescents' reactions to social interactions within the paradigm allow one to draw inferences about adolescents' reactions to social environments outside of the laboratory. As described below, the Unfamiliar Peer Paradigm builds on personality and social psychology literature supporting that judgments about behavior based on "thin slices" or samples of behavior provide clinically useful and valid information about individual differences in behavior.

Exposure, Extinction Learning, and Habituation

Tasks within the Unfamiliar Peer Paradigm mimic key processes underlying exposure-based therapies for social anxiety disorder. Behavioral theory suggests that individuals develop anxiety through pairing a neutral *conditioned stimulus* (e.g., interaction with unfamiliar peers) with an aversive *unconditioned stimulus* (e.g., social rejection; Alfano & Beidel, 2011). Their pairing develops such that exposure to the conditioned stimulus reliably predicts the unconditioned stimulus, and in turn generates a *conditioned response* (e.g., racing heart, sweating) that resembles an individual's *unconditioned response*. For example, in the case of

social anxiety, an adolescent may experience an embarrassing event in the presence of unfamiliar peers that results in social rejection. Through fear conditioning, the adolescent then associates the negative event with all interactions with unfamiliar peers, and subsequently experiences physiological and cognitive manifestations of anxiety when encountering unfamiliar peers. Over time, the adolescent avoids interactions with unfamiliar peers. This avoidance behavior serves to reduce anxiety in the moment but negatively reinforces the behavior, leading to continued social anxiety symptoms and related impairments. Thus, exposure-based therapies require an individual to interact with feared stimuli (e.g., spiders, unfamiliar peers; Raggi et al. 2018).

Inhibitory learning is central to exposure-based therapy (Sewart & Craske, 2020). Inhibitory learning occurs when a client repeatedly interacts with a feared situation (i.e., conditioned stimulus) without the feared outcome (i.e., unconditioned stimulus). Inhibitory learning can also occur when a client learns through experience that the feared outcome is manageable and tolerable (e.g., social rejection occurred but the client is able to cope with this event). This process allows clients to create and strengthen new, non-threatening associations with the conditioned stimulus, allowing them to achieve long-term reductions in their fear of the stimuli targeted in exposures (i.e., *extinction*; Craske, Hermans, & Vervliet, 2018; Tolin, 2019).

Exposure-based therapies are well-established as effective psychological interventions for anxiety disorders (for a review, see Craske et al., 2014). Yet, the degree to which a client experiences a beneficial and long-lasting treatment response requires experiencing inhibitory learning. This presents a clinical challenge. Indeed, anxious individuals' behavior during therapeutic exposures—and characteristics of therapeutic exposures themselves—may impede inhibitory learning and fear extinction (Sewart & Craske, 2020). Even when exposures facilitate fear extinction, clients may experience *spontaneous recovery*, or a reemergence of the

conditioned response to feared stimuli (Quirk, 2002). Thus, facilitating long-term inhibitory learning should be of the utmost concern for optimizing clients' treatment responses. Germane to use of the Unfamiliar Peer Paradigm in basic research on mechanisms of change in exposure-based therapies, we highlight three factors that impact clients' inhibitory learning: (a) safety behaviors, (b) stimuli variability, and (c) expectancy violations.

   Safety behaviors. Safety behaviors are actions that reduce in-the-moment anxiety (Piccirillo et al., 2016), and therefore adolescents experiencing social anxiety might use safety behaviors while interacting with unfamiliar peers (Figure 1; see also Qasmieh et al., 2018; Thomas, Daruwala, Goepel, & De Los Reyes, 2012). While a reduction in anxiety may be reinforcing to the individual, the use of safety behaviors creates two primary issues in peer interactions. First, using safety behaviors in a peer interaction may hinder the quality of that interaction (e.g., use of a cell phone, limited eye contact; Stangier, Heidenreich, & Schermelleh-Engel, 2006). That is, an adolescent's use of safety behaviors during an interaction may create an awkward experience for the unfamiliar peer. The awkwardness of the interaction can promote a peer's negative perception of the adolescent and increase the likelihood of feared outcomes (e.g., social rejection). Further, safety behaviors may make an adolescent's engagement in social interactions more difficult, because performing the behavior pulls their attention away from the interaction itself (e.g., Rapee et al., 2009). Thus, safety behaviors promote outcomes feared by socially anxious individuals, and may lead to fewer opportunities for developing and maintaining positive social relationships (Cuming et al., 2009).

   In addition to disrupting the quality of social interactions, safety behaviors may limit the positive benefits of exposure-based therapies. When exposed to feared stimuli, the use of safety behaviors can disrupt the inhibitory learning process (Sewart & Craske, 2020). When a client

uses a safety behavior during an exposure, they may credit the safety behavior with experiencing non-aversive outcomes following exposure to the feared stimulus, rather than their successfully confronting the feared stimulus (Hedtke, Kendall, & Tiwari, 2009; Hofmann, 2007). This can reinforce the client's anxiety and use of safety behaviors instead of assisting the client in learning a new association with the feared stimulus. As discussed above, using safety behaviors can be maladaptive in social interactions. Thus, exposure-based therapies must remove safety behaviors to help clients learn new, adaptive associations with feared stimuli. As we describe below, we designed the Unfamiliar Peer Paradigm to facilitate understanding of the links between safety behaviors and mechanisms of change in exposure-based therapies.

   Stimuli variability. Stimuli variability factors prominently in inhibitory learning. The elements of exposures that clients find anxiety-provoking might vary in many ways, including the context, timing, duration, intensity, and expectancies clients have about situations the exposures are designed to reflect (Figure 1). An exposure-based therapy's beneficial effects may be negatively impacted by low stimuli variability and only moving through exposures in a stepped, predictable, or hierarchical manner (Sewart & Craske, 2020). Doing so can lead to very specific inhibitory learning, where the non-aversive association with the feared stimulus is limited to certain conditions. A course of therapy involving exposures that collectively display low stimuli variability may decrease the ability of the client to find cues to associate with learned and adaptive outcomes of the exposures, and may result in spontaneous recovery (Mystkowski, Craske, & Echiverri, 2002). Spontaneous recovery may be particularly likely to occur when the client is unable to generalize their inhibitory learning from stimuli encountered in therapy to stimuli outside of therapy (Craske et al., 2014). When treating social anxiety, context is incredibly important, as many clients display maladaptive fears linked to specific social

interactions (e.g., presenting in class, interacting with peers at a party; Beidel et al., 2010). Thus, use of exposures when treating social anxiety should involve placing the client in varied conditions, so as to optimize inhibitory learning and enhance the likelihood of treatment gains generalizing to the real world. As with safety behaviors, we describe below how we designed the Unfamiliar Peer Paradigm to facilitate understanding links between stimuli variability and mechanisms of change in exposure-based therapies.

Expectancy violations. Rescorla and Wagner's (1972) theory of Pavlovian conditioning posits that successful fear extinction requires an individual to perceive a mismatch between the expected aversive outcome and their actual experience. Stated another way, this element of exposure-based therapy gets at what a client needs to "unlearn" about feared stimuli, with the goal of severing the link between maladaptive expectancies about feared stimuli and actual experiences with these stimuli. In practice, facilitating expectancy violations involves having a client make predictions about what will occur in a feared situation and then completing exposures designed to "test" the client's predictions. The greater the expectancy violation—the greater the mismatch between a client's expectation and the actual outcome during the "test" (i.e., the exposure)—the greater the likelihood that the client experiences inhibitory learning (Craske et al., 2014). Importantly, clients must clearly operationalize their expectancies, which may vary across specific events. These expectancies consist of subjective interpretations of events or feelings of distress (Figure 1). Exposures should be appropriate in length, such that the client has sufficient time to evaluate whether the feared outcomes occurred. In social anxiety, facilitating an expectancy violation often involves having a client predict the likelihood and nature of negative outcomes (e.g., social rejection, physiological symptoms of anxiety) in a social interaction (e.g., asking a peer for help), and then assessing their experiences with an

exposure to that social interaction. In sum, expectancy violations facilitate inhibitory learning by demonstrating to the client the discrepancy between anticipated and actual outcomes. As with safety behaviors and stimuli variability, we describe below how the Unfamiliar Peer Paradigm facilitates our understanding of the links between expectancy violations and mechanisms of change in exposure-based therapies.

Thin Slice Judgments

The ability to draw meaningful inferences from adolescents' reactions to the Unfamiliar Peer Paradigm hinges on evidence indicating that "small samples" of behavior inform valid judgments about how adolescents behave outside of controlled laboratory conditions (Figure 1). A robust line of research in the social and personality literatures informs understanding of judgments or inferences based on small samples of behavior. Specifically, *thin slice judgments* are interpretations of individual characteristics based on a short interaction window (Ambady & Rosenthal, 1992). These judgments validly index an array of behaviors and traits (for a review, see Slepian, Bogart, & Ambady, 2014). Work in clinical psychology finds that thin slice judgments facilitate detecting autism spectrum concerns and personality disorders (Walton & Ingersoll, 2016; Tackett, et al. 2017). In fact, research teams have leveraged this methodology to reliably and validly assess behaviors based on brief social interactions (Murphy, et al. 2015).

Overall, thin slice judgments appear to capture trait-based psychological constructs like neuroticism and agreeableness. Yet, little research informs use of thin slice judgments to assess state-based constructs like social anxiety. That is, although some evidence supports the ability of thin slice judgments to detect state- and trait-based anxiety (for a review, see Harrigan, Wilson, & Rosenthal, 2004), a dearth of research exists on thin slice judgments of anxiety based on in-person observations. Recall that accurately assessing an adolescent client's social anxiety

involves understanding how an unfamiliar peer perceives and reacts to the client. Unfamiliar peers' impressions of adolescent clients facilitate our understanding of clients' use of safety behaviors, how clients react to different social contexts, and methods for constructing exposures to activate expectancy violations. Below, we describe efforts to infuse research and theory on thin slice judgments in elements of the Unfamiliar Peer Paradigm.

Overview of the Unfamiliar Peer Paradigm

The key components of the Unfamiliar Peer Paradigm function like a standardized series of therapeutic exposures used in evidence-based psychosocial interventions for social anxiety. We designed the paradigm to include tasks that can be administered in a standardized fashion, so as to yield data for use in comparing performance within individuals (e.g., changes during the paradigm) and between individuals (e.g., differences between clinical and control groups; see also Groth-Marnat & Wright, 2016). Thus, the paradigm lends itself well to gathering psychometrically sound data about a number of constructs relevant to understanding adolescent social anxiety, and by leveraging a variety of different modalities. Inspired by work on thin slice judgements, features of the Unfamiliar Peer Paradigm allow for research using the paradigm to inform our understanding of mechanisms of change in exposure-based therapies for adolescents.

General Task Procedures

The Unfamiliar Peer Paradigm consists of three social interaction tasks, with a total duration of 20 minutes. We developmentally adapted these tasks from work with adults by Beidel and colleagues (2010). We follow three principles when administering these tasks: counterbalancing, masking, and ensuring unfamiliarity. These principles help us rule out potential confounding variables, thereby providing certainty that adolescents' reactions during the tasks are reflective of their social anxiety when interacting with unfamiliar peers.

Counterbalancing. Adolescents vary considerably in the key social situations that elicit social anxiety symptoms and impairments (Glenn et al., 2019; Hofmann et al., 1999). Thus, for one adolescent, a certain task may elicit a heightened reaction relative to other tasks. However, that same task might elicit little-to-no reaction from a second adolescent receiving the same evaluation. It is also important for assessors to consider how they might have preconceived notions of the social situations that a given adolescent might find most distressing. These notions might influence the selection of tasks and in particular their order of administration, a form of confirmation bias that might negatively impact clinical decision-making (see also Lilienfeld, Ritschel, Lynn, Cautin, & Latzman, 2014). Thus, assessors administering these tasks ought to account for the realities of adolescents' clinical presentations and clinical judgment. The most straightforward way of doing so is by *counterbalancing* or randomly determining the order in which adolescents receive the tasks, using a random number generator, freely available versions of which exist online (e.g., Graphpad Software, 2019). The random assignment of adolescents to the order in which they are exposed to different social interactions facilitates testing questions germane to the effects of stimuli variability on adolescents' reactions to anxiety-provoking social situations. For instance, is the ability of adolescents to habituate to anxiety-provoking social situations affected by *primacy effects* or their initial exposure to specific social situations?

Masking. The second principle we follow concerns the possibility of biasing the reports of peer confederates who interact with adolescents. If a peer confederate enters a task with any knowledge about an adolescent's clinical presentation (e.g., referral question, scores on measures, diagnoses), this knowledge might influence both how they interact with the adolescent, and their impressions of that adolescent's social anxiety concerns. Given these issues, we mask peer confederates to all clinical information regarding the adolescent's case.

Specifically, we restrict peer confederates' access to this information prior to their involvement

in the tasks and completion of social anxiety reports. Masking assists in preserving the integrity

of the "thin slice" nature of peer confederates' reports, in that it ensures that they base their

reports *only* on the small sample of behaviors they observe within the paradigm's tasks.

Ensuring unfamiliarity. When selecting, training, and using peer confederates within

this paradigm, we minimize the likelihood of adolescents knowing peer confederates before the

assessment. Key elements of the paradigm protect against adolescents being familiar with our

peer confederates, including the fact that peer confederates are several years older than the

adolescents assessed. Additionally, peer confederates refrain from all contact with the adolescent

in the time leading up to the administration of the tasks. That is, as the adolescent walks into the

assessment room where the social interactions take place, this marks the first time the adolescent

has any social contact with the peer confederate. Once an adolescent begins the assessment, they

interact with the peer confederate across a series of tasks, which we describe below.

Descriptions of Specific Tasks

In this section, we provide an overview of the tasks administered within the Unfamiliar

Peer Paradigm, followed by a discussion of the paradigm's empirical support. Further, we made

publicly available materials describing key elements of the paradigm, including examples of how

to advertise the peer confederate role to prospective volunteers, as well as recruit, retain, and

train these personnel to serve in the role. Summaries of these materials appear in Supplementary

Table 1. Further, we made all of this material available, along with this paper's supplementary

tables and figures, on the Open Science Framework platform (De Los Reyes, 2020, February 15).

For all tasks described below, confederates undergo a rigorous process where they

receive training on how to act as an unfamiliar same-age peer. The training requires roughly 15

hours to complete. Further, in order to ensure that all peer confederates adequately simulate a same-age peer, we focus on training research personnel who display a youthful physical appearance commensurate with expectations for clients within the mid-to-late adolescent period (i.e., 14-to-15 years of age). Typically, personnel who meet these expectations fall within the late-adolescent and emerging adult periods. As a safeguard for ensuring the youthful nature of peer confederates, we standardize peer confederates' dress code, such that they are instructed to wear adolescent-appropriate clothing, including plain clothes with no apparent clothing labels. Following their completion of these training tasks, peer confederates become part of a team administering study assessments, where they interact with research participants in the three tasks described below.

Simulated Social Interaction Test (SSIT). The SSIT is a structured role-play task where the adolescent and peer confederate interact with each other in a series of six role-plays (e.g., one practice scene and five task scenes). These role-plays are designed to mimic common, potentially anxiety-provoking situations that teens may find themselves in on a daily basis, including offering and accepting help, giving and receiving compliments, and being verbally teased. For each role-play scene, peer confederates receive training on how to deliver two scripted lines in an emotionally-appropriate manner (e.g., sad, happy, or neutral) matched to the context of the role-play. Each scene lasts for approximately 1 to 3 minutes. Each scene also follows the same sequence of administration: (a) the task administrator describes the scene; (b) the peer confederate gives the first scripted line and waits for the adolescent to respond; and (c) after the adolescent's response to the first scripted line the confederate states their second scripted line and waits for the adolescent to respond before the scene ends.

Unstructured Conversation Task (UCT). The UCT is an unstructured role-play where the adolescent and the peer confederate interact for 3-minutes. The UCT simulates a time where an adolescent may have to initiate a conversation in order to interact with a fellow peer, with no set rules or expectations for social engagement. In fact, during this task, the only instructions the adolescent receives from the task administrator are:

> Let's pretend (*adolescent's name*) that it is your first day at a new school and you don't know anyone. You walk into your first period class and see (*unfamiliar peer's name*) sitting at his/her desk. You notice that there is an empty seat next to (*unfamiliar peer's name*). You decide to walk over to the empty seat, you sit down, and you say…

Unlike the SSIT, the UCT does not involve training peer confederates on making scripted responses to adolescents' interactions with them. However, confederates do receive training on how to respond neutrally and allow the adolescent to lead the conversation. Furthermore, we train peer confederates to make standardized responses to certain common questions from adolescents. For instance, in response to a question like, "*What do you do for fun?*," we train confederates to respond as a 14-to-15-year-old would consistent with media and books currently popular with adolescents in this age range. Additionally, at no point do task administrators tell adolescents that the peer confederates with whom they interact are same-age peers. Thus, sometimes during the UCT an adolescent might ask about the confederate's age. Accordingly, we train confederates to respond to questions as if they were a same-age peers (e.g., Adolescent: "*How old are you?*"; Confederate: "*I am 15.*").

Impromptu Speech Task (IST). The IST is a standardized speech task designed to be similar to situations where adolescents might have to speak publicly to an audience. For this task,

the task administrator instructs the adolescent to give a speech based on their own personal

opinion for three predetermined topics (e.g., political, public health, and legal topics). The

adolescents are provided a 3-minute period to prepare for their speech by writing notes on the

topics, but they are not allowed to refer to their notes during the task. The task administrator also

instructs the adolescents to speak for 10 minutes, with the option of speaking for a minimum of 3

minutes if they feel too anxious to continue speaking. During the task, the adolescent gives their

speech to an audience composed of the task administrator, the peer confederate involved in the

SSIT and UCT, and a second trained confederate whom the adolescent has not yet met. Audience

members receive training on how to behave during the task (e.g., maintain neutral facial

expressions, refrain from engaging in verbal or non-verbal interactions with the adolescent).

Data Derived from the Unfamiliar Peer Paradigm

A key strength of the social interaction paradigm described in this paper is the ability to

extract psychometrically sound data across multiple assessment modalities. First, embedded in

the paradigm are procedures for collecting single-item self-reports of state arousal from

adolescents, based on a well-established, freely available assessment paradigm that is sensitive to

moment-to-moment changes in arousal (Self-Assessment Manikin; Lang, 1980). Specifically,

following participation in each of the social interaction tasks, adolescents use the Self-

Assessment Manikin to self-report on their subjective experiences during the task. The repeated

administration of these assessments throughout the paradigm allows us to address questions

germane to adolescents' subjective experiences when interacting with unfamiliar peers, as well

as expectancy violation and habituation processes. Indeed, below we describe how researchers

might leverage these repeated administrations to understand how social interactions with

unfamiliar peers impact adolescents' lived experiences with their anxiety, and whether infusing

opportunities for expectancy violations results in changes to adolescents' reactions to the tasks. Further, below we describe several studies that leveraged data across multiple information sources (i.e., adolescent, independent observer, peer confederate), domains (i.e., social anxiety and its associated features), and modalities (e.g., observed behavior and surveys) that demonstrate the veracity of data gathered from these arousal self-reports.

Second, as mentioned previously, a long line of research in evidence-based assessment of adolescent anxiety indicates the need to collect not only self-report data, but also data from observers of adolescents' behavior (Alfano & Beidel, 2011; Silverman & Ollendick, 2005). We previously demonstrated that interactions with unfamiliar peers can be observed or video recorded, providing opportunities for coding of adolescent behaviors using trained raters of social anxiety as well as domains relevant to adolescent social anxiety (e.g., social skills; De Los Reyes et al., 2019b; Glenn et al., 2019). Of note, prior work has long involved leveraging ratings of adolescent behavior from trained observers (Silverman & Ollendick, 2005). A key innovation of the Unfamiliar Peer Paradigm is that one can obtain psychometrically sound ratings from *untrained raters* in the form of the peer confederates who interact with adolescents during the tasks (Deros et al., 2018; Glenn et al., 2019). Specifically, following their interactions with each adolescent, peer confederates make reports about the adolescent's social anxiety using parallel versions of surveys administered to parents and adolescents. As previously stated, peer confederates receive training on how to interact with adolescents participating in the task. Yet, when completing adolescent social anxiety reports, peer confederates receive nothing more than modified versions of the instructions that adolescents and parents receive to complete reports on the same survey instruments. This element of the Unfamiliar Peer Paradigm—informed by research and theory on thin slice judgments—allows for testing questions about unfamiliar peers'

impressions of the adolescents with whom they interact, and the behaviors adolescents display within these interactions (e.g., safety behaviors). In fact, below we describe evidence indicating that reports gathered from peer confederates provide incrementally valuable information, over-and-above reports taken from other observers of adolescents' behavior (e.g., parents). Supplementary Table 1 includes links to the surveys we use to gather informants' reports as well as macros for scoring these surveys.

Empirical Support for the Unfamiliar Peer Paradigm

Four lines of empirical work support the psychometric properties and clinical value of data extracted from the Unfamiliar Peer Paradigm. First, when adolescents exposed to this paradigm self-report about their arousal during unfamiliar peer interactions, their self-reported arousal relates to self-reports of their social anxiety taken before these social interactions (Deros et al., 2018). Further, adolescents' self-reported arousal during these social interactions relate to their self-reports of associated features of social anxiety taken before the interactions, such as depressive symptoms, fears of being evaluated, and safety behaviors (Deros et al., 2018; Karp et al., 2018; Qasmieh et al., 2018; Rausch et al., 2017). These data indicate that this social interaction paradigm yields clinically relevant data conducive to understanding adolescents' anxiety-related reactivity to interactions with unfamiliar peers.

Second, effects observed based on adolescent self-reports are corroborated by trained, independent observers' ratings of adolescent behavior during the tasks (Glenn et al., 2019). In this study, independent observers' ratings also distinguished adolescents on referral status, in that they rated adolescents who were clinically referred for a social anxiety evaluation as displaying significantly higher anxiety and lower social skills, relative to a control group of adolescents. Recent work also finds that lower levels of independent observers' ratings of adolescent social

skills during social interactions relates to greater adolescent self-reported and parent-reported levels of adolescent psychosocial impairments (De Los Reyes, et al., 2019b).

Third, additional corroboration of the ability of this social interaction paradigm to yield clinically meaningful data comes from data provided by the peer confederates themselves. Peer confederates' social anxiety reports (a) distinguish adolescents on referral status and predict adolescents' self-reported arousal within the social interactions (Deros et al., 2018), (b) relate to independent observers' ratings of adolescent anxiety and social skills (Glenn et al., 2019), and (c) relate to adolescents' survey self-reports of social anxiety, depressive symptoms, and safety behaviors (Deros et al., 2018; Qasmieh et al., 2018).

Fourth, prior work indicates that adolescents' reactions to the social interaction tasks reflect interactions with same-age peers, and more generally to "life outside of the assessment." Specifically, Karp and colleagues (2018) examined adolescents' self-reported arousal during the SSIT, UCT, and IST and their self-reported reactions to a well-established computer-based task of social exclusion— "Cyberball" (Williams, Cheung, & Choi, 2000)—in which adolescents are directly told they would be interacting with same-age peers. In Karp and colleagues (2018), adolescents' self-reported arousal when interacting with peer confederates predicted their reactions to exposure to social exclusion via the Cyberball task. Further, as mentioned previously, several investigations find that adolescents' reactions to the Unfamiliar Peer Paradigm relate to their self-reports of social anxiety and a host of other domains, including depressive symptoms, fears of being evaluated, safety behaviors, and psychosocial impairments (see De Los Reyes et al., 2019b; Deros et al., 2018; Glenn et al., 2019; Karp et al., 2018; Qasmieh et al., 2018; Rausch et al., 2017). Overall, prior work indicates that the Unfamiliar Peer Paradigm yields sound data about adolescents' anxiety-related interactions with unfamiliar peers.

Future Directions in Research and Proof of Concept Data

We designed the Unfamiliar Peer Paradigm with the goal of informing research on mechanisms of change in exposure-based therapies for adolescent social anxiety. As mentioned previously, a hallmark principle of therapeutic exposures involves the need to tailor exposures to the unique needs of clients (Raggi et al., 2018). In line with this, we developed the paradigm, anticipating that future research might involve modifying the paradigm to address questions beyond the scope of its initial construction.

Thus, in this section we highlight five directions for future research using the Unfamiliar Peer Paradigm. Within each of the subsections highlighting the five research directions, we report "proof of concept" data supporting each direction we propose. These data come from a well-characterized mixed clinical/community sample of 105 14-15 year-old adolescents to whom we administered the Unfamiliar Peer Paradigm; 37 adolescents referred for a clinical evaluation for social anxiety (i.e., *clinic-referred adolescents*) and 68 adolescents participating in a non-clinic study about family relationships (i.e., *community control adolescents*). For many of the "proof of concept" tests reported below, we combined data from these two groups as one pooled sample, as has been done in several investigations using this sample (e.g., Deros et al., 2018; Glenn et al., 2019; Karp et al., 2018; Szollos et al., 2019). To justify use of this approach, we conducted chi-square tests of demographic differences to identify whether these two groups differed on demographic characteristics that might confound our interpretations of the findings we observed: adolescent age, adolescent gender, ethnic/racial background, family income, marital status. Given the exploratory nature of these comparisons, we applied a Bonferroni correction to these tests (i.e., 11 tests and a corrected p value of .0045), and observed no significant differences between clinic-referred and community control groups.

Extensive descriptions of this sample and the larger study from which it originated exist elsewhere. Specifically, for each of the instruments used for the "proof of concept" tests below, several pieces of work attest to their psychometric properties when specifically used with this sample (e.g., Beale et al., 2018; De Los Reyes et al., 2019b; Deros et al., 2018; Glenn et al. 2019; Karp et al., 2018; Qasmieh et al., 2018; Rausch et al., 2017; Szollos et al., 2019). These instruments include survey measures about adolescent social anxiety and safety behaviors completed by adolescents (Social Interaction Anxiety Scale, Social Phobia and Anxiety Inventory for Children, Subtle Avoidance Frequency Examination; Beidel et al., 1995; Cuming et al., 2009; Masia-Warner et al., 2003; Piqueras et al., 2012; Rapee et al., 2009; Silverman & Ollendick, 2005; Tulbure et al., 2012; Zubeidat et al., 2007). These instruments also include measures used to assess adolescent behavior during the Unfamiliar Peer Paradigm completed by peer confederates (Social Interaction Anxiety Scale; Deros et al., 2018), adolescents (Self-Assessment Manikin; Bradley & Lang, 1994; Lang, 1980), or trained independent observers (ratings of observed social anxiety and social skills; Beidel et al., 2010; Glenn et al., 2019; Wong et al., 2012). We report descriptive statistics for each of these measures in Table 1.

Research Direction #1: How Do Unfamiliar Peers Perceive Adolescents?

Exposure-based therapies focus on reducing clients' perceived distress during anxiety-provoking social situations in an effort to reduce maladaptive reactions to these situations. Yet, successfully reducing clients' perceived distress during therapeutic exposures does not guarantee the maintenance of treatment gains. Indeed, by definition the social environments that provoke clients' distress are interpersonal in nature. Even if clients begin to develop adaptive reactions to exposures in the therapy room, the negative impressions clients might make in the presence of social interaction partners may persist and impede therapeutic progress. Stated another way, the

way clients behave with same-age peers may nonetheless discourage peers outside of the therapy setting from developing and sustaining positive social relationships with clients. This reality of social interaction dynamics may inhibit clients from improving aspects of their social worlds that contribute to the maintenance of social anxiety symptoms and impairments, and thus may increase risk for spontaneous recovery. As such, a key direction for future research involves understanding the degree to which real world unfamiliar peers' perceptions of clients threaten the ability of exposure-based therapies to produce benefits that stand the test of time.

The Unfamiliar Peer Paradigm may facilitate our understanding of how unfamiliar peers perceive adolescent clients. In particular, perceptions of clients' behavior as displayed within therapeutic exposures may allow researchers to identify those at risk for continued impairments in social relationships, as well as address novel questions germane to how unfamiliar peers perceive clients. Do unfamiliar peers *see* adolescents' distress, and if so, to what aspects of adolescents' behavior do they attend (e.g., emotive facial expressions or body movements indicative of distress)? Do negative perceptions from unfamiliar peers relate to the quality of the social interaction? Over the course of treatment, can therapeutic exposures facilitate improving unfamiliar peers' impressions of adolescents experiencing social anxiety? Do improvements in these impressions vary by social contexts (e.g., improvements within group interactions but not one-on-one interactions)? Peer interactions are dyadic and bidirectional in nature, and thus research should address the experience of both the adolescent with social anxiety as well as the unfamiliar peer with whom they interact.

Researchers may leverage the Unfamiliar Peer Paradigm to address many questions related to unfamiliar peers' impressions of the adolescents with whom they interact. Indeed, a key element of the paradigm involves collecting reports from the peer confederates tasked with

interacting with the adolescent participants. We collect these reports from *naïve* raters (Deros et al., 2018). Unlike the independent observers from whom we collect ratings based on videotaped observations of participants (Glenn et al., 2019), peer confederates receive no training on how to make ratings on the widely used survey measures that parents and adolescents complete. In this way, we leverage peer confederates' reports as we would any third-party lay observer from whom we solicit a subjective report. This increases the likelihood that peer confederates' impressions of the participants with whom they interact validly reflect the impressions that participants make on unfamiliar peers outside of research or therapy settings.

Proof of concept data. A key prerequisite to using the paradigm to understand observers' impressions involves determining whether it provides the observations necessary to gather ecologically valid data about these impressions. We report two sets of findings addressing this issue. First, we computed bivariate correlations between peer confederates' social anxiety reports and ratings from trained, independent observers of adolescents' social anxiety and social skills as displayed within the Unfamiliar Peer Paradigm. We observed large-magnitude correlations (i.e., r's $\geq$ .5; Cohen, 1988) between peer confederates' reports and trained observers' social anxiety ratings ($r = .59$; $p < .001$) and social skills ratings ($r = -.58$; $p < .001$).

Second, we previously mentioned the crucial need to understand adolescents' subjective experiences with distress when interacting with unfamiliar peers. To what degree do peer confederates "see" this distress? At the bivariate level, peer confederates' reports correlated with adolescents' self-reported arousal during the paradigm at roughly large-magnitude levels ($r = .44$; $p < .001$). Further, we conducted a hierarchical multiple regression in which adolescents' baseline arousal ratings were entered in the first step, peer confederates' social anxiety reports were entered in the second step, and a composite score of adolescents' arousal ratings during the

paradigm was entered as a dependent variable. Over-and-above the variance accounted for by adolescents' baseline arousal ratings ($\Delta R^2 = .18$; $\beta = .43$; $p < .001$), we observed a medium-magnitude (i.e., $\beta \geq .3$; Cohen, 1988) relation between peer confederates' reports and adolescents' arousal ratings when interacting with unfamiliar peers ($\Delta R^2 = .12$; $\beta = .36$; $p < .001$). Thus, one can use data from the Unfamiliar Peer Paradigm to gain valid information about observers' impressions of adolescent social anxiety. In line with these findings, an important next step involves identifying whether peer confederates' reports can serve as markers of impaired interpersonal functioning following therapy.

Research Direction #2: What Roles Do Safety Behaviors Play in Adolescents' Interactions with Unfamiliar Peers and the Maintenance of Social Anxiety?

If peer confederates' reports facilitate identifying clients who may display continued impairments in interpersonal functioning following exposure-based therapy, what might be one mechanism of action? More broadly, when exposure-based therapies fail to produce lasting effects, what factors might explain these failures? Within exposure-based therapies for adolescent social anxiety, the presence of safety behaviors displayed during exposures might explain the maintenance of social anxiety (e.g., Sewart & Craske, 2020). Although therapeutic exposures serve as "teachable moments" that facilitate extinction-based learning, exposures cannot serve as opportunities to learn if clients behave in such a way that inhibits this learning (Raggi et al., 2018). Safety behaviors appear to constitute a maladaptive strategy for reducing distress within anxiety-provoking social situations: Their presence during exposures minimizes distress to a sufficient extent that clients fail to engage the habituation and/or expectancy violation processes that are integral to treatment response (Piccirillo et al., 2016). Further, clients who display safety behaviors in social interactions also tend to be viewed by observers as

socially awkward and generally unpleasant as social interaction partners (Stangier et al., 2006). These negative impressions likely limit clients' abilities to initiate and maintain adaptive social relationships. In these respects, safety behaviors may play dual roles in inhibiting treatment responses, by (a) limiting the pedagogical potency of therapeutic exposures during treatment and (b) impeding the ability of clients to form lasting social bonds with others following treatment.

The Unfamiliar Peer Paradigm allows researchers to address research questions germane to displays of safety behaviors when interacting with unfamiliar peers, and in doing so facilitates carving a path to two related directions for future research. First, when adolescents engage in safety behaviors during exposures, what behaviors do they typically display? Do the impacts of these behaviors vary in their negative effects, depending on the social context? For example, safety behaviors like avoiding eye contact during a social interaction or rehearsing what one plans to say in advance of a social interaction may matter to a far greater degree for one-on-one interactions (e.g., walking up to someone at a party) than they do in group settings (e.g., oral presentation in class). Item-level analyses of specific safety behaviors displayed in interactions with unfamiliar peers may facilitate identifying candidate behaviors that ought to be directly targeted for reduction during exposures.

A second direction for future research might involve focusing on how unfamiliar peers react to adolescents' safety behaviors. Specifically, researchers might leverage the Unfamiliar Peer Paradigm to detect observable behaviors with interaction partners that serve as markers of unfamiliar peers' negative reactions to safety behaviors. Perhaps interaction partners react in discrete, specific ways in response to safety behaviors (e.g., averted eye gaze)? If research finds that safety behaviors yield predictable behavioral responses by interaction partners, these markers may help therapists provide feedback to clients about not only how safety behaviors

produce maladaptive *internal* responses in clients but also maladaptive *external* responses from interaction partners in their social worlds. For both of these research directions, research that leverages the Unfamiliar Peer Paradigm may contribute knowledge on mechanisms of action in exposure-based therapies, and potentially inform efforts to modify these therapies to combat the negative effects of safety behaviors.

Proof of concept data. The degree to which the Unfamiliar Peer Paradigm yields ecologically valid data about adolescent safety behaviors hinges, in part, on whether safety behaviors displayed *outside* of the paradigm's tasks relate to behaviors displayed in these tasks. In fact, bivariate correlations reveal that adolescents' self-reports of safety behaviors relate at medium-sized magnitudes with ratings from trained, independent observers of adolescents' social anxiety ($r = .39$; $p < .001$) and social skills ($r = -.39$; $p < .001$) during the paradigm.

Additionally, similar to our "proof of concept" tests for Research Direction #1, we were curious as to whether adolescents' self-reports of safety behaviors would predict their subjective experiences with distress within the Unfamiliar Peer Paradigm. At the bivariate level, adolescents' self-reported safety behaviors correlated with their self-reported arousal during the paradigm at roughly large-magnitude levels ($r = .49$; $p < .001$). Further, we conducted a hierarchical multiple regression in which adolescents' baseline arousal ratings were entered in the first step, adolescents' self-reports were entered in the second step, and a composite score of adolescents' arousal ratings during the paradigm was entered as a dependent variable. Over-and-above the variance accounted for by adolescents' baseline arousal ratings ($\Delta R^2 = .19$; $\beta = .43$; $p < .001$), we observed a medium-magnitude relation between adolescents' self-reported safety behaviors and adolescents' arousal ratings when interacting with unfamiliar peers ($\Delta R^2 = .13$; $\beta = .38$; $p < .001$). Thus, one can use data from the Unfamiliar Peer Paradigm to gain an

understanding about adolescent safety behaviors. In line with these findings, important next steps include linking safety behaviors displayed within the Unfamiliar Peer Paradigm to both observers' impressions of adolescents' interpersonal functioning and the degree to which adolescents respond to exposure-based therapy.

Research Direction #3: To What Degree Do Adolescents Display Stimuli Variability in Their Reactions to Interacting with Unfamiliar Peers?

We previously discussed the idea that clients vary considerably as to the social contexts that elicit social anxiety symptoms and impairments (Bögels et al., 2010). For those adolescent clients whose concerns manifest prominently within social interactions with unfamiliar peers, we know relatively little about key elements of their responses to exposure-based therapy. Two questions warrant consideration. First, do levels of social anxiety vary by social context, and if so, which social contexts tend to elicit the greatest concerns among adolescents? For instance, there is reason to believe that adolescent clients may be particularly impacted by social contexts with relatively little structure or performance expectations, like social gatherings, relative to more structured interactions that one might encounter in routine performance settings (e.g., oral presentations at school; Hofmann et al., 1999). Developing an understanding about situations that tend to provoke varying degrees of distress might inform versions of the Unfamiliar Peer Paradigm that are tailored to assess treatment response at specific treatment phases. For instance, tasks within the paradigm that provoke relatively low degrees of distress might be implemented early in treatment, followed by moderately and highly distressing tasks at the mid-point and near the end of treatment, respectively. This structure may allow for tracking treatment responses so as to reduce practice effects (i.e., repeated administrations of specific tasks during treatment).

A second and related question concerns the effects of stimuli variability on treatment responses. That is, how much variability in social situations do clients require to achieve lasting treatment responses? Given the variability in contexts administered within the Unfamiliar Peer Paradigm, a key element of its utility in informing our understanding of adolescents' responses to exposure-based therapy may lie in its use as a marker of sensitivity to the effects of stimuli variability. For example, consider an adolescent client who undergoes an assessment using all three tasks within the Unfamiliar Peer Paradigm at the beginning, middle, and end of treatment, and for whom each task signaled relatively high distress at the beginning of treatment. What if that client achieves clinically significant treatment responses as indexed by changes in some but not all tasks? Does this variability in treatment response signal that this client may be at risk for failing to maintain treatment gains? The Unfamiliar Peer Paradigm may inform development of metrics in treatment response linked to stimuli variability, and as such may facilitate detecting clients who require additional care following a usual course of exposure-based therapy.

Proof of concept data. The tasks within the Unfamiliar Peer Paradigm vary considerably in the kinds of real world social situations they were designed to reflect. Thus, we built a considerable amount of stimuli variability into the tasks. The degree to which this level of stimuli variability can meaningfully inform research on treatment response within exposure-based therapies hinges on whether one can quantify changes in reactions to the tasks as a function of this variability. In Tables 2-4 we present the findings of several generalized estimating equations (GEE) in which we entered independent observers' ratings of social anxiety (Table 2) and social skills (Table 3), and adolescents' self-reported arousal (Table 4), as repeated-measures dependent variables. In each of these GEE models, we entered referral status as a between-subjects factor, social context (i.e., the three tasks in the paradigm) as a within-subjects factor,

and their interaction as a third factor. Each of these models revealed a significant referral status main effect, such that across tasks, clinic-referred adolescents displayed greater levels of observed social anxiety, lower levels of observed social skills, and greater self-reported arousal relative to community control adolescents. Each of these models also revealed a significant social context main effect, such that the tasks varied in their eliciting distress-related reactions from adolescents. Yet, main effects regarding social context (and their interaction with referral status effects) varied by measurement modality. For GEE models focused on observers' ratings (Tables 2 and 3), adolescents displayed significantly greater levels of social anxiety and lower levels of social skills during the task that prompted them to strike up a conversation at school with an unfamiliar peer (UCT), relative to the other tasks (IST and SSIT). Thus, based on observers' ratings, adolescents experienced the most aversive reactions to the task with the least structure and thus the greatest amount of uncertainty regarding performance expectations.

Compared to GEE models testing effects based on observers' ratings, the model testing effects based on adolescents' self-reported arousal revealed quite distinct social context effects (Table 4). Here, adolescents perceived their greatest level of arousal-related distress when speech-giving (IST), relative to the other tasks (UCT and SSIT). Further, this effect was moderated by referral status, such that, although both clinic-referred and community control adolescents displayed the same pattern of distress across tasks (IST > UCT > SSIT), and clinic-referred adolescents experienced more arousal than community control adolescents on the UCT and SSIT, they did not significantly differ on the IST.

Overall, our "proof of concept" data support the idea that the Unfamiliar Peer Paradigm may inform research on the effects of stimuli variability on response to exposure-based therapies. However, an interesting direction for future research involves understanding why variations in

concerns elicited by the social contexts reflected in the paradigm's tasks (i.e., UCT, SSIT, and IST) operated differently depending on the assessment modality (i.e., independent observer vs. self-report). Importantly, adolescents' perceived experiences with anxiety during social interactions commonly disagree with data taken from other measures of their reactions to those same interactions (e.g., direct measures of physiological arousal; Anderson & Hope, 2009; Thomas, Aldao, & De Los Reyes, 2012). In this case, the discrepant findings regarding trained observers' ratings and adolescents' self-reports might reflect the perceived saliency of anxiety-related reactions to social experiences. That is, observers might perceive that distress displayed during routine one-on-one interactions to be more impactful to an adolescent's functioning than distress displayed during social situations where displaying distress is a normative experience (e.g., public speaking). These ideas merit further study.

Research Direction #4: Do Data Collected about Interactions with Unfamiliar Peers Facilitate Clinical Decision-Making and Estimating Treatment Response?

We previously discussed that a key rationale for constructing the Unfamiliar Peer Paradigm involved developing a standardized set of ecologically valid exposures that had the "look and feel" of those administered within exposure-based therapies. In fact, we adapted the tasks administered within the paradigm from tasks used to assess treatment response within controlled trials of social anxiety treatment (Beidel et al., 2010; Beidel et al., 2014; Beidel, Turner, & Morris, 2000; Bunnell, Beidel, & Mesa, 2013). We constructed the paradigm to understand how adolescent clients interact with unfamiliar peers—key social contexts for which few opportunities exist for gathering data specific to these contexts. Thus, we see a key direction for future research focused on innovating novel methods for facilitating clinical decision-making when working with adolescents experiencing concerns within these contexts.

In particular, we see controlled laboratory research with the Unfamiliar Peer Paradigm playing an important role in linking reactions to interactions with unfamiliar peers to established and clinically feasible tools. For example, research along these lines could inform the development of clinical thresholds on measures used to screen for and diagnose social anxiety. Using thresholds gleaned from this research, one could use time- and cost-efficient clinical measures to estimate performance within the Unfamiliar Peer Paradigm. This would be particularly valuable research for informing clinical decision-making within treatment settings that lack the time and training necessary to administer this paradigm. Alternatively, for those treatment settings where administration of the paradigm is feasible, research might focus on constructing metrics for identifying when clients' performance on the tasks approached normative levels of performance. Further, the data presented in Tables 2-4 support the ability of detecting differences on reactions to the tasks, both *between* adolescents who vary on clinically meaningful indices (e.g., referral status), as well as *within* adolescents in terms of how they react to different tasks within the paradigm. Similarly, efforts in constructing normative values could focus on global clinical thresholds (e.g., meeting diagnostic criteria vs. not) or thresholds specific to social contexts (i.e., separate thresholds for performance on the UCT, IST, and SSIT).

Proof of concept data. Bivariate correlations reveal that the well-established self-report measure Social Phobia and Anxiety Inventory for Children (SPAIC; Beidel et al., 1995, 2000) relates at moderate-to-large levels with observer-rated social anxiety ($r = .44$; $p < .001$), observer-rated social skills ($r = -.41$; $p < .001$), and adolescent self-reported arousal ($r = .67$; $p < .001$). Further, we conducted a hierarchical multiple regression in which adolescents' baseline arousal ratings were entered in the first step, adolescents' SPAIC self-reports were entered in the second step, and a composite score of adolescents' arousal ratings during the paradigm was

entered as a dependent variable. Over-and-above the variance accounted for by adolescents'

baseline arousal ratings (ΔR^2 = .19; β = .43; p < .001), we observed a large-magnitude relation

between SPAIC self-reports and adolescents' arousal ratings when interacting with unfamiliar

peers (ΔR^2 = .27; β = .60; p < .001). This first set of "proof of concept" findings reveal that

adolescents' reactions to these tasks relate to well-established survey measures that are readily

administered in routine care settings.

A second set of "proof of concept" findings focus on linking performance to established

clinical thresholds on the SPAIC. In particular, prior work recommends use of a threshold of 18

to screen for diagnosable social anxiety concerns (Beidel et al., 1995). Using this score, we

identified those scoring above (n = 40) and below (n = 65) the cutoff, and conducted two sets of

analyses. Specifically, we conducted independent samples t-tests comparing adolescents above

the SPAIC cutoff on peer confederates' social anxiety reports (M = 44.54, SD = 18.73),

adolescents' self-reported arousal (M = 2.91, SD = 0.82), independent observers' ratings of social

anxiety (M = 3.41, SD = 0.68), and independent observers' ratings of social skills (M = 3.06, SD

= 0.89) to adolescents below the SPAIC cutoff on these same indices (respectively: M = 32.36,

SD = 15.63; M = 2.03, SD = 0.69; M = 2.78, SD = 0.83; M = 3.65, SD = 0.82). These tests

revealed that relative to adolescents below the SPAIC cutoff, adolescents above the cutoff

displayed significantly greater confederate-reported social anxiety (t = 3.55; p < .01; 95% CI:

5.38, 18.97; d = 0.70), greater self-reported arousal (t = 5.88; p < .001; 95% CI: 0.58, 1.17; d =

1.16), greater observer-rated social anxiety (t = 3.99; p < .001; 95% CI: 0.31, 0.93; d = 0.83), and

lower observer-rated social skills (t = -3.48; p < .01; 95% CI: -0.93, -0.25; d = -0.69), with

magnitudes of differences in the moderate-to-large range (i.e., $d \geq$ .5 and $d \geq$ .8, respectively;

Cohen, 1988). Importantly, our findings converge with considerable evidence that the SPAIC

relates to observed behavior and diagnostic status, and demonstrates sensitivity to treatment response (for reviews, see Silverman & Ollendick, 2005; Tulbure et al., 2012).

In another set of analyses, we examined changes in adolescent performance on the Unfamiliar Peer Paradigm over the seven assessment periods across the three tasks (i.e., five SSIT scenes, UCT, IST). In Table 5, we report descriptive statistics for the whole sample and across the three assessment modalities for which we collected these ratings: self-reported arousal and observer-rated social anxiety and social skills. In a series of repeated-measures analyses of variance (ANOVAs) in which we treated each assessment modality as a repeated-measures dependent variable, we modeled this dependent variable as a function of time (within-subjects), SPAIC cutoff (between-subjects), and their interaction. Descriptive data linked to these ANOVAs appear in Supplementary Figure 1, which can be found in the Open Science Framework project described previously (De Los Reyes, 2020, February 15). We observed a significant time main effect for observed social anxiety ($F = 7.38$; $p < .001$; $\eta^2 = .32$), a non-significant time main effect for observed social skills ($F = 2.20$; $p = .50$), and a significant time main effect for self-reported arousal ($F = 36.48$; $p < .001$; $\eta^2 = .69$). We also observed non-significant time x SPAIC cutoff interaction effects for all three models (all ps $> .15$). Germane to future research on clinical decision-making, we observed significant SPAIC cutoff main effects for observed social anxiety ($F = 8.71$; $p < .01$; $\eta^2 = .08$), observed social skills ($F = 7.95$; $p < .01$; $\eta^2 = .07$), and self-reported arousal ($F = 32.62$; $p < .001$; $\eta^2 = .24$). Collectively, these main effects indicated that relative to adolescents below the SPAIC cutoff, adolescents above the SPAIC cutoff displayed significantly greater observed social anxiety and self-reported arousal, and significantly lower observed social skills throughout the assessment periods of the paradigm. Overall, these findings provide "proof of concept" support for the ability of data taken from the

Unfamiliar Peer Paradigm to distinguish reactions to the task by adolescents displaying clinically elevated social anxiety from reactions by adolescents who do not display clinically elevated social anxiety. Future research should examine whether indices derived from the paradigm can be used for the purposes of clinical decision-making (e.g., informing diagnosis and treatment planning) and estimating treatment response.

Research Direction #5: Do Therapeutic Exposures Focused on Adolescents' Interactions with Unfamiliar Peers Result in Expectancy Violations and/or Stimulus Habituation?

A key challenge in exposure-based therapy involves constructing therapeutic exposures that serve as ecologically valid reflections of social interactions with same-age, unfamiliar peers (Raggi et al., 2018). Indeed, personnel in routine care settings (e.g., hospital staff, therapists) often "stand in" to play key roles in therapeutic exposures. These personnel may often serve as "poor fits" as unfamiliar peers given the large discrepancies between their characteristics and those of unfamiliar peers (e.g., age, mannerisms, maturity level). This "weak link" between exposures experienced in the clinic and clients' lived experiences poses risks for a client losing their treatment gains following a course of exposure-based therapy. Further, if poor ecological validity of therapeutic exposures characterizes those typically designed to simulate clients' interactions with unfamiliar peers, it logically follows that we have a poor basic understanding of central elements of exposure-based therapies delivered to adolescent clients. In particular, do adolescent clients habituate to exposures focused on social interactions with unfamiliar peers? What kinds of expectancies do clients have about social interactions with unfamiliar peers? Do these expectancies vary within and across social contexts? Can ecologically valid exposures reflecting these interactions successfully violate clients' expectancies? Are some expectancies regarding interactions with unfamiliar peers impervious to the use of exposures?

A key strength of the Unfamiliar Peer Paradigm involves the ability to tailor its administration to address questions relevant to understanding habituation and expectancy violation processes within exposure-based therapies. The Unfamiliar Peer Paradigm involves administering a series of contextually-varied social interaction tasks in a randomized order. Randomization allows researchers using the paradigm to detect cause-and-effect relations between exposure to specific social experiences and the effect such exposure has on reactions to later social experiences. In this respect, the paradigm informs research in two ways. First, researchers may implement the version of the paradigm described in this paper to understand how adolescents habituate to anxiety-provoking interactions with unfamiliar peers. For instance, do habituation processes vary as a function of primacy effects, such that adolescents are more likely to experience habituation depending on which tasks they experience first? Second, researchers might modify the paradigm to embed opportunities to expose participants to expectancy violations linked to the paradigm's tasks. For example, do the positive benefits of experiencing an expectancy violation within one social interaction facilitate adaptive reactions to subsequent social interactions? How many violations to a maladaptive expectancy (e.g., "People will ignore me", "I won't know what to day") need to occur before adolescent clients cease from having that expectancy when confronting interactions with unfamiliar peers? We expect basic research focused on these two sets of questions to greatly inform work on mechanisms of change in exposure-based therapies.

Proof of concept data. As mentioned previously, for each of the assessment modalities used to track reactions to tasks within the paradigm, we saw little evidence for adolescents displaying habituation to the social interactions across the seven assessment periods (Table 5). Yet, recall that we organized the assessment periods in terms of the counterbalanced order in

which we exposed adolescents to the tasks. In this respect, without knowing the order in which adolescents experienced tasks within the paradigm, one might conclude that adolescents' levels of observed social anxiety and social skills and self-reported arousal in reaction to the tasks administered at the end of the paradigm wind up at about the same levels in reaction to the first task to which there were exposed. It is not until we focus on primacy effects (i.e., the task that adolescents experienced first) that we see evidence of habituation.

We examined changes in adolescent performance on the Unfamiliar Peer Paradigm over the seven assessment periods across the three tasks (i.e., five SSIT scenes, UCT, IST). Specifically, in a series of repeated-measures ANOVAs in which we treated each assessment modality as a repeated-measures dependent variable, we modeled this dependent variable as a function of time (within-subjects), task order (between-subjects), and their interaction. Descriptive data linked to these ANOVAs appear in Supplementary Figures 2, 3, and 4, which can be found in the Open Science Framework project described previously (De Los Reyes, 2020, February 15). We observed significant time main effects for observed social anxiety ($F = 6.03$; $p < .001$; $\eta^2 = .28$), observed social skills ($F = 2.28$; $p < .05$; $\eta^2 = .13$), and self-reported arousal ($F = 39.00$; $p < .001$; $\eta^2 = .71$). We also observed a non-significant task order main effect for observed social anxiety ($F = 2.18$; $p = .12$), and significant task order main effects for observed social skills ($F = 3.62$; $p < .05$; $\eta^2 = .07$) and self-reported arousal ($F = 4.22$; $p < .05$; $\eta^2 = .08$). These main effects were qualified by significant time x task order interaction effects for observed social anxiety ($F = 4.42$; $p < .01$; $\eta^2 = .22$), observed social skills ($F = 3.63$; $p < .01$; $\eta^2 = .19$), and self-reported arousal ($F = 16.47$; $p < .001$; $\eta^2 = .50$). We calculated follow-up polynomial contrasts of the interaction effects we observed.

For observed social anxiety, we found a significant linear effect, characterized by significant habituation effects for those adolescents first exposed to an unstructured conversation with an unfamiliar peer ($F = 7.34$; $p < .01$; $\eta^2 = .13$). Similarly, for observed social skills, we found significant linear ($F = 7.71$; $p < .01$; $\eta^2 = .13$) and cubic ($F = 5.69$; $p < .01$; $\eta^2 = .10$) effects. These effects were characterized by significant habituation effects for those adolescents first exposed to an unstructured conversation with an unfamiliar peer, and significant "rises and falls" in adolescents' observed social anxiety and social skills within the paradigm when exposed to the other two tasks first. Collectively, our findings indicate that for trained observers, adolescents displayed habituation to the Unfamiliar Peer Paradigm when their first exposure to interacting with an unfamiliar peer consisted of an unstructured conversation.

For self-reported arousal, we also found significant linear ($F = 33.29$; $p < .001$; $\eta^2 = .40$) and cubic ($F = 15.70$; $p < .001$; $\eta^2 = .24$) effects indicative of habituation, but a different pattern of findings emerged when compared to findings based on independent observers' ratings. That is, we observed habituation effects for those adolescents first exposed to an impromptu speech, and significant "rises and falls" in adolescents' reactions to the paradigm when first exposed to the other two tasks (i.e., SSIT and UCT). Collectively, our "proof of concept" data indicate that adolescents experienced primacy effects in their habituation to tasks administered in the paradigm. Yet, which specific tasks produced these effects varied by assessment modality and in the same pattern as that observed for stimuli variability effects reported in Tables 2-4 (i.e., unstructured conversation for observer-rated behavior; impromptu speech for self-reported arousal). Overall, these findings support the ability of data taken from the Unfamiliar Peer Paradigm to inform future research on habituation and expectancy violation processes germane to exposure-based therapies targeted to address adolescent social anxiety.

Concluding Comments

In this paper, we described a paradigm for understanding adolescent social anxiety when interacting with unfamiliar peers, informed by the latest research on exposure-based therapies for social anxiety (e.g., Sewart & Craske, 2020). Social anxiety symptoms and impairments experienced within these contexts represent key reasons why adolescents receive treatment (e.g., Glenn et al., 2019; Hofmann et al., 1999). Further, exposure-based therapies for social anxiety require the development and implementation of exposures tailored to the specific contexts within which clients experience concerns (e.g., Alfano & Beidel, 2011; Raggi et al., 2018). This tailoring requires use of sound, context-sensitive assessments, to ensure that therapeutic exposures validity reflect these contexts as they exist outside of the therapy room. Yet, we lack evidence-based paradigms for understanding adolescents' experiences within social interactions with unfamiliar peers. We designed the Unfamiliar Peer Paradigm described in this paper to fill this important gap in the literature on evidence-based assessments of adolescent mental health.

We addressed several topics germane to using the Unfamiliar Peer Paradigm, with an emphasis on use of the paradigm to inform research on mechanisms of change in exposure-based therapies for adolescent social anxiety. Specifically, we provided an overview of the conceptual and empirical foundations of the paradigm, described the tasks in the paradigm, and highlighted principles we follow when administering the paradigm. We also provided an overview of data yielded from the paradigm as well as evidence supporting the psychometric soundness of these data. This overview, which has laid the foundation for a set of important directions for future research, included key empirical data supporting these research directions. In particular, the Unfamiliar Peer Paradigm holds much promise for improving our understanding of several elements of exposure-based therapies for adolescent social anxiety, including peers' impressions

about socially anxious adolescents, safety behaviors, stimuli variability, clinical decision-making and estimating treatment response, as well as habituation and expectancy violations.

Considerations for Using the Unfamiliar Peer Paradigm

The extant data indicate that the Unfamiliar Peer Paradigm holds much promise for informing our understanding of treatments for adolescent social anxiety. Yet, we conclude this paper by highlighting several considerations when using this paradigm in future work.

Feasibility. A key consideration for future research using the Unfamiliar Peer Paradigm concerns its feasibility for use in basic research, and strategies for improving its feasibility. Specifically, we suspect that our ability to administer the paradigm was facilitated by the fact that our laboratory is embedded in a large educational environment. In particular, at our institution, we have access to large pools of undergraduate students interested in gaining research experience, and as such, we have a steady stream of personnel available to serve as peer confederates. Coupled with the large geographic region from which we recruit participants (i.e., Maryland, Virginia, Washington, DC), we have the opportunity to recruit participants with a high degree of certainty that we can administer the paradigm to them using peer confederates with whom they are unfamiliar. These elements of our implementation of the paradigm are found to a lesser extent at (a) educational institutions with a relatively small undergraduate population and (b) geographic regions with a low population density. Thus, in terms of basic research, the Unfamiliar Peer Paradigm might be difficult to implement "as is" outside of laboratories affiliated with large universities embedded within densely populated geographic regions.

At the same time, there is precedent in the literature to support leveraging technology to overcome some of these obstacles to feasibility. Specifically, researchers have leveraged virtual environments to create simulated social interaction partners for use in therapeutic exposures for

social anxiety (e.g., Anderson et al., 2013; Kampmann et al., 2016; Wong Sarver, Beidel, &

Spitalnick, 2014). Of course, in these virtual environments social interaction partners are

simulated or pre-programmed to respond to participants in specific ways. Thus, these virtual

environments would not allow for research on the links between impressions of interaction

partners and participants' performance during therapeutic exposures.

To address questions surrounding observers' impressions of participants, one can

envision use of video teleconferencing or video chat technology (e.g., Skype, Zoom) to create a

virtual space for interactions with unfamiliar peers, as is commonplace in current iterations of

telehealth (see Comer & Myers, 2016). Creating these virtual spaces might allow for laboratories

embedded in smaller educational environments or low-population regions to partner with

personnel outside of these environments. These personnel might serve as peer confederates. An

alternative scenario might involve building networks of laboratories that train their own pools of

peer confederates for use in virtual administrations of the Unfamiliar Peer Paradigm within and

across laboratories. Using peer confederates who virtually interact with adolescent participants

outside of their geographic region may infuse feasibility in the paradigm, and at the same time

ramp up efficiency in recruiting large representative samples of adolescents for future

psychometric work (e.g., developing normative scores for performance on the paradigm).

Assessing mental health domains other than social anxiety. It may be useful to

consider mental health domains beyond social anxiety where impairments in social relationships

might manifest. In particular, deficits in social skills and overall social competence comprise

core areas of concern for such internalizing domains as depression, as well as for externalizing

domains such as inattention and hyperactivity (e.g., APA, 2013; Epkins & Heckler, 2011). Given

the transdiagnostic nature of impairments in interpersonal functioning, variants of the Unfamiliar

Peer Paradigm may prove useful for collecting valid data about adolescents across several mental health domains relevant to relationships with same-age peers.

Clinical utility. Research and theory on evidence-based assessments used to guide clinical work speaks to the need to consider the *clinical utility* of instruments (Hunsley & Mash, 2007). That is, relative to alternative standardized instruments (or no use of such instruments), does a measure improve the ability of mental health professionals to make sound decisions in the delivery of mental health services? We previously discussed several decision-making domains surrounding mental health service delivery that appear particularly crucial to address in future work. Three elements speak to use of the paradigm when delivering mental health services.

First, practitioners might use the Unfamiliar Peer Paradigm to understand the degree to which an adolescent client varies in the contexts that provoke their symptoms and associated impairments. In fact, data reported in this paper support use of easy-to-administer and freely available self-report instruments (e.g., Self-Assessment Manikin) to understand these contextual variations in clients' clinical presentations. Using data from these instruments either alone or in conjunction with more time-intensive assessments (e.g., trained observers' ratings of videotaped footage of adolescents during the paradigm) may facilitate case conceptualization and treatment planning surrounding the social environments that elicit clients' concerns. For example, our proof of concept findings indicate that adolescents tend to self-report the greatest amount of distress during highly structured performance settings (e.g., speech-giving) whereas observers tend to rate the adolescent as most distressed during highly unstructured social settings (e.g., one-on-one conversations with peers at school). The Unfamiliar Peer Paradigm may allow practitioners to understand not only the lived experiences of clients' distress but also how same-age peers might perceive this distress. Integrating these clinical data may help practitioners select

social situations for therapeutic exposures, with an eye toward not only reductions in self-reported distress but also improvements in aspects of social functioning that might contribute to long-term impairments (e.g., how same-age peers view clients).

Second, the Unfamiliar Peer Paradigm provides practitioners with a structured approach to leveraging the assistance of young adults in the delivery of mental health services to adolescents experiencing social anxiety concerns. Indeed, we reviewed evidence indicating that, with relatively little training, lay young adults serving as peer confederates allow practitioners to attain estimates of clients' experiences interacting with unfamiliar peers. In many respects, this element of the paradigm reflects a growing trend in health care, namely that of *task sharing* (for a review, see Kazdin, 2017). As a health care delivery strategy, task sharing involves collaborations between trained professionals and lay individuals to deliver health care services, largely in an effort to reduce health care disparities. Recent work supports the success of this promising, cost-effective, and feasible strategy of service delivery, in particular use of *nonspecialist providers* to deliver evidence-based treatments to address a diverse array of conditions including anxiety, depression, posttraumatic stress, and schizophrenia (e.g., Chibanda et al., 2011, Balaji et al., 2012; Singla et al., 2017). Importantly, we developmentally adapted the Unfamiliar Peer Paradigm based on prior work that used standardized social interaction tasks to monitor treatment response among children and adults (Beidel et al., 2010; Beidel et al., 2014; Beidel, Turner, & Morris, 2000; Bunnell, Beidel, & Mesa, 2013). Thus, similarities between the Unfamiliar Peer Paradigm and tasks used within current exposure-based treatments, coupled with prior work on using lay individuals in service delivery, indicate that the paradigm could be a promising avenue for increasing access to mental health services among adolescents experiencing social anxiety.

One final element of clinical utility warrants discussion, and it has to do with reconciling the discrepant reports commonly obtained in clinical assessments of adolescent social anxiety. Specifically, parents and adolescents often differ to a considerable degree in their impressions of such crucial domains as which concerns ought to be targeted during therapy (Hawley & Weisz, 2003; Yeh & Weisz, 2001) and whether services delivered to address adolescents' needs are actually achieving their intended effects (e.g., De Los Reyes & Kazdin, 2006; Eckshtain et al., 2020). A key observation we have made with the Unfamiliar Peer Paradigm is that, whereas informants surmised to have opportunities to observe adolescents in the unfamiliar peer context make social anxiety reports that predict adolescents' experiences in these contexts (e.g., adolescents, peer confederates), the reports from informants with fewer opportunities to observe these behaviors do not (e.g., parents; see Deros et al., 2018; Karp et al., 2018; Qasmieh et al., 2018). In line with prior work, when informants typically relied on to make clinical decisions related to adolescent social anxiety disagree in their impressions of treatment planning, data derived from the Unfamiliar Peer Paradigm may very well assist in decision-making in this respect. As an example, consider those instances in which parents and adolescents disagree in whether they perceive the adolescent's social anxiety as warranting clinical attention. Data from the Unfamiliar Peer Paradigm may aid therapists in deciphering whether these discrepancies stem from the adolescent's concerns manifesting largely within contexts that the parent has few opportunities to observe (e.g., interactions with peers outside of the home). Similarly, if, over the course of care, parents and adolescents grow to disagree as to the benefits of such care, might repeated administrations of the Unfamiliar Peer Paradigm improve therapists' ability to document changes in social anxiety concerns that some but not all informants possess the opportunity to observe? Indeed, to the degree that the Unfamiliar Peer Paradigm serves as a

standardized set of behavioral exposures, they also represent the very techniques used in

evidence-based psychosocial treatments to facilitate therapeutic change and document changes

over the course of treatment. In these respects, a key element of the Unfamiliar Peer Paradigm's

utility may lie in its ability to facilitate consensus among parents and adolescents involved in

therapy (i.e., shared decision-making) and thus improve therapeutic engagement among these

key stakeholders (see also Langer & Jensen-Doss, 2018).

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Table 1

Means (M) and Standard Deviations (SD) of Summary Scores for Study Measures

Variable	*M*	*SD*
Survey Reports (Informant)		
Social Interaction Anxiety Scale (Peer Confederate)[a]	36.97	17.80
Social Phobia and Anxiety Inventory for Children (Self)	16.62	10.65
Subtle Avoidance Frequency Examination (Self)	66.07	21.34
Adolescent Task Self-Reports: Self-Assessment Manikin		
Resting Baseline	1.51	0.62
Simulated Social Interaction Test	2.01	0.86
Unstructured Conversation Task	2.79	1.26
Impromptu Speech Task[b]	3.72	1.15
Composite Score of All Tasks	2.36	0.85
Independent Observer Ratings of Social Anxiety		
Simulated Social Interaction Test	2.74	0.86
Unstructured Conversation Task	3.26	1.06
Impromptu Speech Task[c]	3.05	0.98
Composite Score of All Tasks[d]	3.02	0.83
Independent Observer Ratings of Social Skills		
Simulated Social Interaction Test[b]	3.65	0.83
Unstructured Conversation Task	2.99	1.31
Impromptu Speech Task[c]	3.66	0.99
Composite Score of All Tasks[d]	3.43	0.89

Note. [a]Due to an administrative error, we did not collect peer confederate reports for two adolescents. [b]For the Impromptu Speech Task, one adolescent was missing self-reported arousal data. [c]For the Impromptu Speech Task, complete data were available for 102 adolescents given that three adolescents declined to give a speech. [d]We computed composite scores for all 105 adolescents. Among these adolescents, some were missing data on one task rating (e.g., one of the five Simulated Social Interaction Test ratings; an Impromptu Speech Task rating). For these adolescents their composite scores were based on the six ratings we had available for them.

Table 2

Generalized Estimating Equation (GEE) Predicting Independent Observers' Ratings of Adolescents' Social Anxiety During Social Interactions as a Function of Referral Status, Social Context, and their Interaction

Main GEE Model[a]	
Factor	**Type III Wald X^2**
Referral Status	14.75***
Social Context	55.38***
Referral Status x Social Context	0.21

Follow-Up Factor Contrasts for Social Context Main Effect				
Contrast	**M^1(SE)**	**M^2(SE)**	**Mean Difference (SE)**	**95% Wald Confidence Interval of Difference Between Means**
[1]UCT vs. [2]IST	3.34 (0.10)	3.14 (0.09)	0.20 (0.09)*	[0.02, 0.38]
[1]UCT vs. [2]SSIT	3.34 (0.10)	2.84 (0.08)	0.51 (0.07)***	[0.36, 0.65]
[1]IST vs. [2]SSIT	3.14 (0.09)	2.84 (0.08)	0.30 (0.07)***	[0.16, 0.44]

Note. **SSIT** = Simulated Social Interaction Test; **UCT** = Unstructured Conversation Task; **IST** = Impromptu Speech Task; [a]Analyses based on scores of 105 adolescents, as we mean imputed data for the three adolescents for whom we did not have independent observer data for the IST; *M* = Mean; *SE* = Standard error. Factor contrasts based on comparisons of factors in descending order. The Referral Status factor (coded in ascending order) was coded community control and then clinic-referred. The Social Context factor (coded in ascending order) was coded 0 = SSIT, 1 = UCT, and 2 = IST. All interaction terms calculated based on factors coded with the lowest possible value being "0". *$p < .05$; **$p < .01$; ***$p < .001$.

Table 3

Generalized Estimating Equation (GEE) Predicting Independent Observers' Ratings of Adolescents' Social Skills During Social Interactions as a Function of Referral Status, Social Context, and their Interaction

Main GEE Model[a]	
Factor	**Type III Wald X^2**
Referral Status	10.44*
Social Context	45.38**
Referral Status x Social Context	0.83

Follow-Up Factor Contrasts for Social Context Main Effect				
Contrast	**M^1(SE)**	**M^2(SE)**	**Mean Difference (SE)**	**95% Wald Confidence Interval of Difference Between Means**
[1]UCT vs. [2]IST	2.89 (0.13)	3.58 (0.10)	-0.69 (0.12)**	[-0.93, -0.45]
[1]UCT vs. [2]SSIT	2.89 (0.13)	3.58 (0.08)	-0.68 (0.10)**	[-0.89, -0.48]
[1]IST vs. [2]SSIT	3.58 (0.10)	3.58 (0.08)	0.002 (0.08)	[-0.17, 0.17]

Note. **SSIT** = Simulated Social Interaction Test; **UCT** = Unstructured Conversation Task; **IST** = Impromptu Speech Task; [a]Analyses based on scores of 105 adolescents, as we mean imputed data for the three adolescents for whom we did not have independent observer data for the IST; *M* = Mean; *SE* = Standard error. Factor contrasts based on comparisons of factors in descending order. The Referral Status factor (coded in ascending order) was coded community control and then clinic-referred. The Social Context factor (coded in ascending order) was coded 0 = SSIT, 1 = UCT, and 2 = IST. All interaction terms calculated based on factors coded with the lowest possible value being "0". *p < .01; **p < .001.

Table 4

Generalized Estimating Equation (GEE) Predicting Adolescent Self-Reported Arousal During Social Interactions as a Function of Referral Status, Social Context, and their Interaction

Main GEE Model[a]	
Factor	**Type III Wald X^2**
Referral Status	5.83*
Social Context	259.72***
Referral Status x Social Context	11.85**

Follow-Up Factor Contrasts for Referral Status x Social Context Interaction Effect				
Contrast	**M^1(SE)**	**M^2(SE)**	**Mean Difference (SE)**	**95% Wald Confidence Interval of Difference Between Means**
[1]Clinic-Referred IST vs. [2]Clinic-Referred UCT	3.77 (0.20)	3.24 (0.23)	0.53 (0.13)***	[0.27, 0.79]
[1]Clinic-Referred IST vs. [2]Clinic-Referred SSIT	3.77 (0.20)`	2.46 (0.17)	1.31 (0.16)***	[1.00, 1.62]
[1]Clinic-Referred UCT vs. [2]Clinic-Referred SSIT	3.24 (0.23)	2.46 (0.17)	0.78 (0.13)***	[0.52, 1.03]
[1]Community Control IST vs. [2]Community Control UCT	3.69 (0.13)	2.54 (0.13)	1.15 (0.14)***	[0.87, 1.43]
[1]Community Control IST vs. [2]Community Control SSIT	3.69 (0.13)	1.76 (0.07)	1.93 (0.12)***	[1.68, 2.18]
[1]Community Control UCT vs. [2]Community Control SSIT	2.54 (0.13)	1.76 (0.07)	0.78 (0.11)***	[0.57, 0.99]
[1]Clinic-Referred IST vs. [2]Community Control IST	3.77 (0.20)	3.69 (0.13)	0.08 (0.24)	[-0.39, 0.56]
[1]Clinic-Referred UCT vs. [2]Community Control UCT	3.24 (0.23)	2.54 (0.13)	0.70 (0.26)**	[0.18, 1.21]
[1]Clinic-Referred SSIT vs. [2]Community Control SSIT	2.46 (0.17)	1.76 (0.07)	0.70 (0.18)***	[0.34, 1.06]

Note. **SSIT** = Simulated Social Interaction Test; **UCT** = Unstructured Conversation Task; **IST** = Impromptu Speech Task; [a]Analyses based on scores of 105 adolescents, as we mean imputed data for the one adolescent who did not provide self-reported arousal data for the IST; *M* = Mean; *SE* = Standard error. Factor contrasts based on comparisons of factors in descending order. The Referral Status factor (coded in ascending order) was coded community control and then clinic-referred. The Social Context factor (coded in ascending order) was coded 0 = SSIT, 1 = UCT, and 2 = IST. All interaction terms calculated based on factors coded with the lowest possible value being "0". *$p < .05$; **$p < .01$; ***$p < .001$.

Table 5

Means and Standard Deviations of Task Ratings within the Unfamiliar Peer Paradigm, in Order of Administration

Variable (Informant)	T1	T2	T3	T4	T5	T6	T7
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*
Observed Social Anxiety (Independent Observer)[a]	3.04(1.06)	2.92(0.98)	2.77(0.91)	2.67(0.91)	2.77(1.05)	2.88(1.01)	2.97(1.09)
Observed Social Skills (Independent Observer)[a]	3.53(1.11)	3.64(0.96)	3.66(0.85)	3.62(0.97)	3.61(1.05)	3.42(1.15)	3.42(1.19)
Self-Assessment Manikin (Adolescent)[b]	3.05(1.18)	2.45(1.27)	2.07(1.11)	1.86(1.00)	1.89(1.11)	2.47(1.39)	2.75(1.30)

Note. [a]Analyses for T1, T4, T6, and T7 based on scores from 104 adolescents; analyses reported in Supplementary Figures 1, 2, and 3 based on these data resulted in an analytic sample of 101 adolescents; [b]Analyses for T1 based on scores from 104 adolescents; analyses reported in Supplementary Figures 1 and 4 based on these data resulted in an analytic sample of 104 adolescents; M = Mean; SD = Standard deviation.
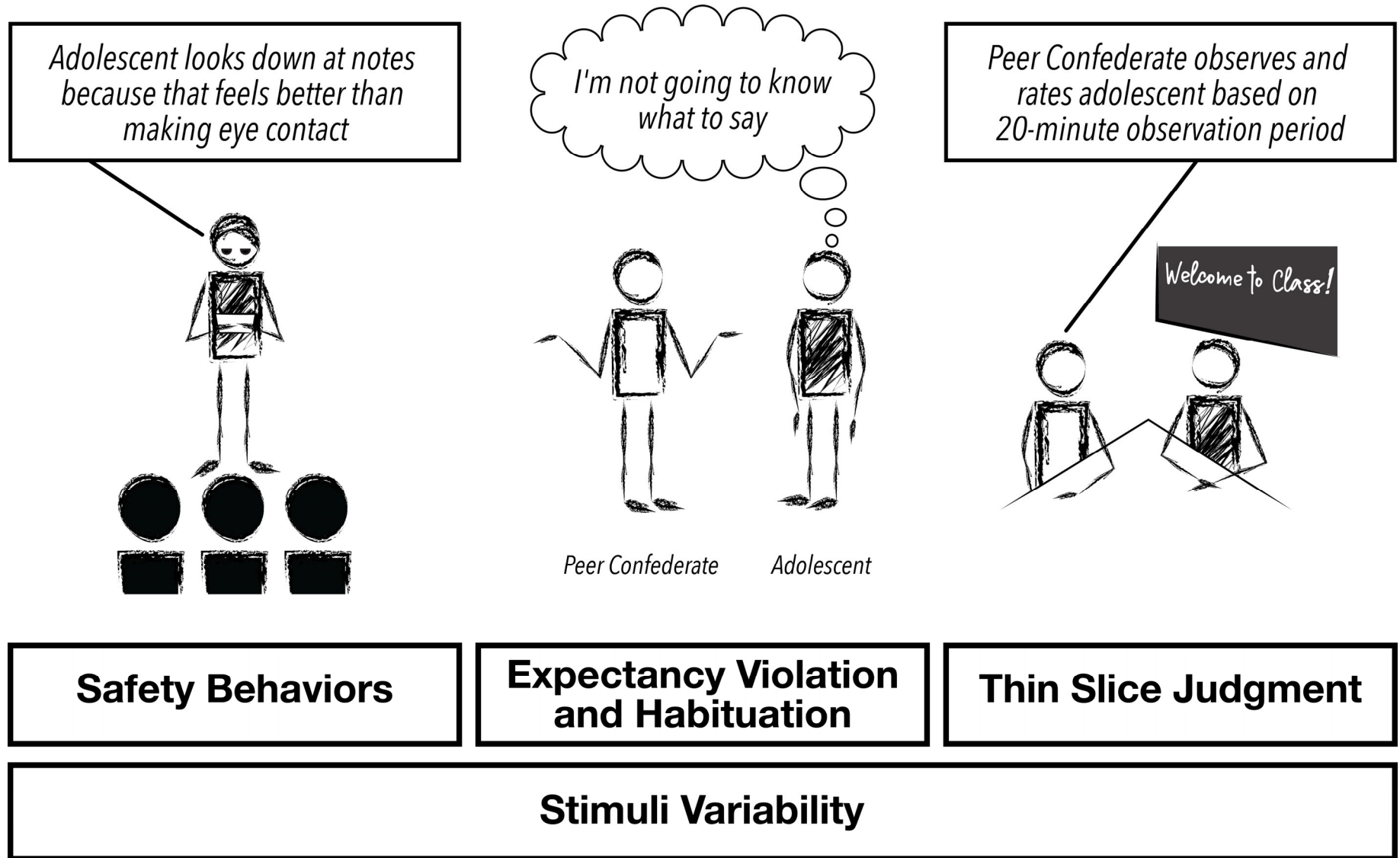
Figure 1. Graphical depiction of the conceptual and empirical foundations of the Unfamiliar Peer Paradigm. The Unfamiliar Peer Paradigm's origins lie in research and theory in clinical psychology on mechanisms of change in exposure-based therapies, namely work on clients' use of safety behaviors during therapeutic exposures, the need to consider stimuli variability or the degree to which exposures vary on key elements of anxiety-provoking situations, and the importance of expectancy violation and habituation processes in therapy. The paradigm's origins also lie in research and theory in personality and social psychology on thin slice judgments, or the ability to gather clinically useful information about adolescent social anxiety based on the small "samples" of behavior displayed during tasks within the paradigm.