Adolescent Experiences with the Intolerance of Uncertainty, Worry, and Anxious Arousal in Social and Academic Contexts

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ABSTRACT

Adolescent Experiences with the Intolerance of Uncertainty, Worry, and Anxious Arousal in Social and Academic Contexts

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Objective: The present study assessed the functional associations between the intolerance of uncertainty (IU), worry, and arousal as components of anxiety in preadolescents, as well as the longitudinal effects of friendship security and intimacy on anxiety. It was expected that IU and worry would be most strongly related to each other at both times and that friendship security, rather than intimacy, would have a protective effect on anxiety by inhibiting IU. **Method:** Preadolescents ($N = 216$) in grades 5 and 6 ($M_{age} = 11.35$) completed self-report questionnaires at two times across a two-month period. Participants rated newly developed items designed to assess anxiety (IU, Worry and Arousal) in social and test situations, and rated items of depressed affect, friendship security, and intimacy. **Results:** Confirmatory factor analyses demonstrated that this new tool proved to be a valid and reliable measure of the anxiety constructs. Further, analyses revealed that (1) worry and arousal demonstrated the strongest association among the 3 anxiety components, (2) IU was a more powerful antecedent to worry than it was to arousal at both times, (3) IU was indirectly related to depressed affect, and (4) friendship security was negatively related to IU over time. **Conclusions:** Overall, these findings provide important insights into the organizational and hierarchical structure of anxiety in preadolescence and lend further empirical support to the importance of friendships on reducing internalizing symptoms. These results have important implications for enhancing the treatment of anxiety and depressed affect, by including a focus on the intolerance of uncertainty.

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“The oldest and strongest emotion of mankind is fear, and the oldest and strongest kind of fear is fear of the unknown”

– Lovecraft (1927)

Adolescent Experiences with the Intolerance of Uncertainty, Worry, and Anxious Arousal in Social and Academic Contexts

Anxiety includes cognitive, behavioural and physiological components that become activated in the face of potential threats. Those who experience anxiety are at increased risk for developing other forms or comorbid problems (e.g., depressed affect) later on in life (Hong, Lee, Tsai & Hui Tan, 2017). A developmental perspective of anxiety recognizes that normative and pathological anxiety are at different ends along the same continuum (Broeren, Muris, Diamantopoulou & Baker, 2013). Despite the extensive literature focusing on the risk factors for anxiety in adolescence, basic questions about the functional associations between the components of anxiety, about their continuity over time, and the protective effects of friendships remain unanswered (Nelemans, Hale, Branje, Meeus & Rudolph, 2017).

Given that anxiety can impact a child's involvement in developmentally salient domains of functioning, there is a critical need to better understand how negative cognitive responses, specifically an intolerance of uncertainty (IU) and worry, and physiological arousal, can work together to affect a child's psychological well-being across the school year. As such, the overarching goal of the current study is to investigate the degree to which the individual components of anxiety and symptoms of depressed affect are related to each other and to examine how these associations vary across common occurrences in primary school (i.e., social, test). Furthermore, the present study also seeks to examine the role of IU in children's academic (i.e., test) and social experiences and the extent to which its continuity is impacted by positive aspects of friendship quality.

Anxiety in Childhood & Preadolescence

Social fears and concerns about school performance are common occurrences in middle childhood that are usually manifested as part of typical development (Beesdo, Knappe, Psych & Pine, 2009). Although symptoms of anxiety have been shown to remain relatively stable over time in youth, some studies have demonstrated that there are developmental differences in the expression and continuation of anxiety symptoms across age groups (e.g., Field & Lester, 2010). For example, younger children often report bodily complaints, such as headaches, dizziness, and stomach aches (Friedberg & McClure, 2002). Given that they are less sophisticated in their coping and avoidance strategies, younger children may externalize their symptoms and display

more overt signs of anxiety, including nail biting, thumb sucking, inattentiveness, and distractibility. In addition, due to limitations in their cognitive development, younger children may have difficulty accurately labeling and reflecting on their thoughts, feelings and worries, and as a result of their limited verbal capacity, they may describe feeling "jumpy" or "weird" inside (Friedberg & McClure, 2002).

As children mature, their cognitive capacities become increasingly developed, and their fears may start to revolve around anticipatory events and more abstract stimuli (Gullone, 2000). Thus, cognitive vulnerabilities to anxiety, such as worry and IU can emerge and become more apparent as they enter the early teenage years (Hong et al., 2017). As a result, the interplay between the cognitive, behavioural, and physiological components involved in the experience of anxiety can be extremely distressing and may lead to significant impairments in emotional functioning. Moreover, preadolescence is a time in the lifespan that is typically characterized by rapid biological, social, and cognitive changes (Nelemans et al., 2017). Young teenagers may be faced with new academic and social challenges, and therefore experiences with negative emotions such as anxiety can preclude their participation in social and academic opportunities that promote the skills needed for full functioning in adulthood (McEvoy & Mahoney, 2012).

Anxiety as a Multidimensional Construct

Cognitive models posit that anxiety refers to a complex response to situations that are deemed aversive or to unknown situations (Carleton, 2016). Anxiety is multidimensional and is comprised of several processes that interact to affect the various ways in which symptoms can be experienced, manifested, and maintained across individuals. Prominent models of anxiety, including the Triple Vulnerability Model (Barlow, Ellard et al., 2014) recognizes three broad components that make up the construct: (1) cognitive, which involves one's subjective interpretation of external and internal stimuli, (2) physiological or experiential, defined as an individual's internal states or the activation of one's autonomic nervous system, and (3), behavioural, which refers to one's response to these stimuli. These processes are largely interrelated, and are activated by the experience of unknowns and in the face of uncertainty (Carleton, 2016). As such, an emerging literature has begun to focus on how IU affects the development of internalizing disorders, including anxiety.

IU is defined as a cognitive bias that affects how a person perceives, interprets, and responds to uncertain situations (Dugas, Schwartz & Francis, 2004). Individuals who are

intolerant of uncertainty perceive uncertainty and ambiguity as being stressful, frustrating, and anxiety-provoking and react negatively on a cognitive, emotional, and behavioural level (McEvoy & Mahoney, 2012). This attentional bias toward threat-related stimuli (i.e., uncertainty) will minimize the resources one has available to allocate to other incoming information (Ellenbogen & Schwartzman, 2009). From an evolutionary perspective, the activation of the autonomic nervous system in the face of fear and uncertainty can be adaptive and serve as a protective mechanism against predation (Carleton, 2012). However, those with increased levels of IU tend to interpret all ambiguous information and novel situations as threatening, which may promote the onset of worrisome thinking as well as encourage avoidance behaviours, which are responsible for the maintenance of anxiety (Carleton, 2012).

Current investigations with children and preadolescents have placed little emphasis on IU. Evidence suggests that the basic cognitive skills necessary for detecting and responding to uncertainty develop throughout middle childhood and early adolescence (Roebers et al., 2007; Weil et al., 2013). Accordingly, there is a critical need to understand how IU functions to affect other forms of anxiety in early adolescence. Early work on the concept of IU was developed to explain maladaptive worry, which is characteristic of generalized anxiety disorder (GAD) in adults. Specifically, Laugesen, Dugas, and Bukowski (2003) initially proposed an adult model in which IU was perceived as being a form of cognitive vulnerability that contributes to excessive worry. Although they are strongly related, IU and worry are theoretically distinct constructs. Read and colleagues (2013) suggested that IU is a cognitive filter or set of beliefs about uncertainty and its consequences. As Read et al. suggest, it "colors the way in which individuals perceive their environment" (p. 722). Contrarily, worry refers to the act of engaging in a chain of negative and uncontrollable thoughts about potential future events whose outcomes are uncertain (Fialko, Bolton & Perrin, 2012). Thus, both components involve cognitive processes, but perhaps in order to worry in the first place, one must possess a core belief that uncertainty will lead to negative outcomes and should therefore be avoided. Therefore, IU may promote worry which perpetuates negative emotions.

Treatment studies conducted with adults have emphasized the advantages of targeting IU in the treatment of GAD (Dugas & Ladouceur, 2000). Recent studies, however, have demonstrated that IU is not exclusive to GAD, despite the fact that individuals with GAD may find most types of uncertainty aversive (Anderson, Dugas, Koerner, Radomsky, Savard, &

Turcotte, 2012). Evidence indicates that IU affects various internalizing disorders including obsessive-compulsive disorder (Boelen & Reijntjes, 2009), social anxiety (Hoffman & Barlow, 2002), panic disorder (Carleton, Sharpe & Asmundson, 2007), and depression (McEvoy & Mahoney, 2012). It has been proposed that the association between IU and depression is due to the strong link between anxiety and depression (Carleton, 2012). Additionally, other researchers have suggested that their association may be due to the fact that rumination in depression involves a similar thought process to IU and worry, which involves the anticipation of negative future events (Yook, Kim, Suh and Lee, 2010). Thus, it appears that IU may in fact represent a broad dispositional risk factor for various forms of psychopathology.

To date, studies with preadolescents have not examined the components of anxiety that impede competence in the developmentally salient domains of functioning and little is known about the effects of IU and its stability over time in this age group. This period of the lifespan is a time when young teenagers find themselves in social or academic situations where there are constant opportunities for being evaluated by others. In this way, it is a time when feelings of anxiety can become more pronounced. This limited attention is a critical weakness in the current literature given the developmental risk that is posed by experiences of worry, uncertainty and depressed affect in early adolescence.

Limitations of Current Literature and Measurement

The current literature on IU is limited in 3 ways. First, the assessment of anxiety lacks a valid, reliable, and comprehensive measure that is designed to capture its multidimensional nature and conceptual breadth in a way that limits participant burden. To assess negative emotions in early adolescence, there needs to be clear and reliable measures of IU, worry, and arousal (Dugas et al., 1998). For example, the Multidimensional Anxiety Scale for Children – Second Edition (MASC-2; March, 2013) is a self-report scale suited for youth between the ages of 8 and 19. It contains items designed to assess the following scales: (a) separation anxiety/phobia; (b) social anxiety; (c) GAD; (d) obsessions and compulsions; (e) physical symptoms, and (f) harm avoidance. Interestingly, the MASC-2 does not include a measure of IU. Recently, however, Comer and colleagues (2009) developed an IU scale to be used with children (Intolerance of Uncertainty Scale for Children; IUS-C). This scale contains 27 items and is designed to assess overall levels of IU in children between the ages of 7 and 17. Considering the apparent developmental differences during such a broad age range, younger children may have

more difficulty understanding the items as they are not as cognitively advanced and demonstrate different abilities for self reflection compared to older children (Osmanagaoglu et al., 2018). In addition, more information is needed regarding the test-retest reliability of this questionnaire, as is an examination of the measure's factor structure, which has produced mixed findings (Cornacchio et al., 2018). These lengthy questionnaires are not ideal for younger children and can contribute to fatigue, lower response rates and reduced data quality (Rolstad, Adler & Ryden, 2011).

Second, current measures of anxiety lack contextual specificity and breadth. Adolescents function in many contexts including the social and academic domains (Nelemans et al., 2017). It is well documented that uncertainty can differentially impact an individual and produce different responses depending on the context (Carleton, 2016). For example, although the number of "unknowns" (i.e. uncertainty) may be the same across two scenarios, an individual may be more comfortable and confident in their skills to respond in one context (social situations), versus the other (testing situations). Unfortunately, many of the items in the IUS-C do not provide any contextual cues. For example, items such as "When it is time to do things, not knowing what could happen keeps me from acting" and "The smallest doubt can stop me from doing things" are vague. This degree of ambiguity can make it challenging for a child to relate to the items being presented. More importantly, such a measure lacks the ability to provide crucial information regarding whether a child is generally anxious across all contexts, or more anxious in one context relative to another.

Third, there is little clarity with regards to IU and its stability over time in early adolescence. Studies employing longitudinal designs would provide us with this information. Hence, one of the purposes of this study is to address these important limitations and validate a newly developed measure of anxiety that is comprehensive, developmentally appropriate, and captures these 3 anxiety-related processes in this population across salient contexts.

Importance of Friendship Quality

A central feature of theory about well-being in early adolescence is the claim that the experience of anxiety during this developmental period can be moderated by experiences with a friend (Sullivan, 1953; Adams, Santo & Bukowski, 2011). For school-age children, friendship experiences are an integral part of one's social context. Aside from interacting with parents and teachers, children begin to spend more time with their friends than with others (Rubin, Bukowski,

& Parker, 2006). However, it has been noted that anxiety is most detrimental on one's interpersonal relationships (Kashani & Orvaschel, 1990). Specifically, anxious youth are more likely to display social difficulties, and consequently are at an increased risk for being victimized (Erath, Flanagan, & Bierman, 2007; La Greca, & Harrison, 2005), and having low quality friendships (Crawford & Manassis, 2011) compared to their non-anxious peers.

According to Sullivan (1953), the characteristics of a friendship are crucial when considering the role that friendship plays in emotion regulation. As children develop more sophisticated cognitive and emotional skills, they begin to engage in friendships and relationships that are characterized by increased levels of self-disclosure, intimacy, and self-reflection. Therefore, friends can influence healthy development across the lifespan. For example, it has been demonstrated that friendship protects at-risk children from both externalizing and internalizing problems during the school-age period (Laursen, Bukowski, Nurmi & Aunola, 2007) and that friendship moderates escalations in depressed affect among avoidant and excluded children (Bukowski, Laursen & Hoza, 2010). Moreover, it has been argued that specific features of friendship, namely friendship security, can minimize the continuity of anxiety in adolescence (Wood, Bukowski & Santo, 2015). Although Wood and colleagues (2015) demonstrated that friendship security and intimacy significantly predicted decreases in feelings of anxiety over time, a unidimensional measure of anxiety was used in their study. Due to this limitation, little is known about the specific components of anxiety that are likely to be impacted by friendship factors, and therefore, the manner in which friendship disrupts the stability of anxiety over time is unclear.

Taken together, these findings illustrate the well-known protective effect that peers can have on anxiety during this period of the lifespan. To our knowledge, no study to date has investigated the effects of friendship quality on IU. Given that IU involves a sense of unpredictability, it can be anxiety-provoking for a child. It is possible that this feeling may be attenuated by a highly secure and supportive friendship. In other words, feeling secure within a friendship involves knowing that you can count on your friend and that they will be there for you in times of need. Thus, friendship security can function to provide a sense of increased certainty for a child, and help a preadolescent cope with negative thoughts and emotions, which may reduce symptoms of anxiety and provide opportunities for positive growth (Nelemans et al.,

2017). With this in mind, the second major goal of this study is to investigate the degree to which friendship security and intimacy attenuate levels of IU, and thus anxiety, in preadolescents.

The Present Study

The objectives of the current study are to address the 3 limitations mentioned previously related to the study of IU in young samples. The present study will use innovative directions for the continued study of the multidimensional nature of anxiety in early adolescence. Using a newly developed measure, this study will investigate the relations between the constructs of IU, worry, arousal, and depressed affect in preadolescents. The present study also seeks to investigate whether positive aspects of friendship quality can minimize the continuity of negative emotional experiences in the social and test contexts. To accomplish this, a longitudinal design was employed, with two time points across a 2-month period, to evaluate the factor structure of our newly developed measure of anxiety, and to assess the degree to which IU, worry and arousal predict depressed affect.

First, this study seeks to examine how maladaptive cognitive processes (i.e., IU, worry) and internal states (i.e., arousal) function together and contribute to the maintenance of anxiety and depressed affect symptoms over time. We are interested in investigating the hierarchical organization between IU, worry and arousal. Specifically, we predict that IU and worry will be more strongly related to each other at both times (T1 and T2), than either one is to arousal. This hypothesis is based on the premise that IU and worry are both cognitive components of anxiety, compared to arousal, which is physiological. Next, we are interested in examining the degree to which IU differentially predicts worry and arousal. Given the robust associations found in the literature between IU and worry, we suspect that IU will be a more powerful antecedent to worry than to arousal at both times (T1 and T2). With regards to the relationship between IU and depressed affect, we predict that IU will be indirectly related to depressed affect. Specifically, we predict that the indirect effect of IU to depressed affect via the component of worry will be stronger than the indirect effect of IU via the arousal component.

The second objective of the current study is to determine whether positive aspects of friendship quality, such as security and intimacy, can minimize the continuity of negative emotional experiences. This study seeks to replicate and extend findings from Wood and colleagues (2015), in that friendship security at T1, not intimacy, will moderate the stability of IU, worry and arousal across time. We suspect that friendship security will have the strongest

effect on the continuity of IU from Time 1 to Time 2 and that it will be negatively associated with each of the 3 anxiety components across time. This hypothesis is based on the idea that friendship security will have a protective effect by inhibiting IU, and thus minimizing levels of worry and arousal.

Method

Participants

Participants were 216 fifth and sixth grade students (112 females, 104 males) attending two bilingual (English/French) primary schools. Data were collected from 100 students in grade 5 and 116 students in grade 6, with a mean age of 11.35 (*SD* = 0.73), and a broad representation of socioeconomic status. Children were recruited in their classrooms during class and given that they were minors, they were provided with detailed letters outlining the objectives and requirements of the current study to bring home to their parents (refer to Appendix A). Children were encouraged to discuss their participation with their parents and were informed that their participation was completely voluntary. Parental consent forms were signed and returned to each child's classroom teacher (refer to Appendix B). Once parental consent was obtained, child assent was also required. It is important to note that the names of the children who did not take part in the study were not included when assessing peer data.

Procedure

Ethical approval from the Office of Research at Concordia University was first received for this research project, followed by informed consent from the school board and the school principals of the participating institutions. Once parental consent was obtained and the classroom recruitment phase was completed, the dates during which the 2 waves of data collection would take place were arranged at each school. Children completed self-report questionnaires at 2 time points, once in February 2017 (T1) and again 2 months later in April 2017 (T2). Students completed the questionnaires at their desks during class time using Inquisit on tablet computers. A pilot data collection demonstrated that computer-presented questionnaires can be used efficiently by children of this age and in a timely manner compared to paper questionnaires. All responses were anonymous as each child was pre-assigned a participant ID number which was entered into the tablet computer prior to the administration of the questionnaire. Laboratory members were present in each classroom during the data collection in order to provide help when requested by a student. If at any point a child wished to discontinue their participation, their data was discarded. There were no inclusion/exclusion criteria for this study.

Measures

At each assessment time (T1 and T2), participating children rated items designed to assess anxiety, depressed affect and friendship quality.

Components of anxiety. Items intended to assess the specific components of anxiety, IU, worry, and physiological arousal, in social and test contexts were developed and used in this study. These items are shown in Tables 1 and 2.

The intolerance of uncertainty. Seven items were used to measure IU at each time. Three items were designed to assess IU as it relates to the social domain of functioning (e.g., "It bothers me when I am with other boys and girls my age and I don't know what we will be doing"), and 4 items were designed to assess IU in the test domain of functioning (e.g., "It bothers me when I don't know what to expect on an upcoming test"). Children used a five-point scale with endpoints *never* (1) and *almost always* (5) to rate each item. Higher scores on measures of IU indicated higher levels of the intolerance of uncertainty. Scores on the IU items in the social domain were reliable (Cronbach's $\alpha = 0.80$ and 0.77 at T1 and T2, respectively), as were scores on the IU items in the test domain of functioning (Cronbach's $\alpha = 0.85$ and 0.84 at T1 and T2, respectively).

Worry. Nine items were used to measure worry. Five items were designed to assess worry in the social context (e.g., "When I meet someone new, I worry that this new person will not like me"), and 4 items were designed to assess worry in the test context (e.g., "I often worry that I will get a bad grade on a test"). Children used a five-point scale with endpoints *never* (1) and *almost always* (5) to rate each item. Higher scores on these items indicated higher levels of worry. Scores on the worry items in the social domain were reliable (Cronbach's $\alpha = 0.87$ and 0.84 at T1 and T2, respectively), as were scores on the worry items in the test domain of functioning (Cronbach's $\alpha = 0.88$ and 0.88 at T1 and T2, respectively).

Physiological arousal. Seven items were used to measure internal states of anxiety, or physiological arousal. Five items were designed to assess arousal in the social context (e.g., "I get stomach aches when I am around other kids my age"), and 4 items were designed to assess arousal in the test context (e.g., "My heart beats really fast when I have to take a test"). Children used a five-point scale with endpoints *never* (1) and *almost always* (5) to rate each item. Higher scores on these items indicated higher levels of physiological arousal. Scores on the arousal items in the social domain were reliable (Cronbach's $\alpha = 0.88$ and 0.86 at T1 and T2, respectively), as were scores on the arousal items in the test domain of functioning (Cronbach's $\alpha = 0.85$ and 0.86 at T1 and T2, respectively).

Depressed affect. Using a five-point scale with endpoints *never* (1) and *almost always* (5), children rated three items that were designed to assess levels of depressed affect: (a) "I feel lonely", (b) "I feel sad", and (c) "I feel unhappy". Higher scores indicated higher levels of depressed affect. Depressed affect scores demonstrated good levels of internal consistency in the present sample (Cronbach's $\alpha = 0.82$ and 0.88 at T1 and T2, respectively). Descriptive statistics calculated for the measure of depressed affect are presented in Table 3.

Friendship quality. In order to assess positive aspects of friendship quality at Time 1, participants responded to a set of items intended to measure friendship security (e.g., "I am sure that this friendship will last for a long time") and intimacy (e.g., "I can talk to my friend about everything that is on my mind"). Items were scored on a five-point Likert scale ranging from *very untrue* (1) and *very true* (5), with higher scores indicating greater levels of intimacy and/or security within friendships. Friendship security and intimacy scores demonstrated good levels of internal consistency (Cronbach's $\alpha = 0.78$ and 0.88, respectively). Descriptive statistics calculated for these two measures of friendship quality are presented in Table 4.

Table 1. Descriptive Statistics for Anxiety Self-Report Measures (Time 1)

Items	Cronbach's α	*M* (SD)
Intolerance of Uncertainty- Social	.80	2.26 (1.22)
It bothers when I am with other boys and girls my age and I don't know what we will be doing		
It bugs me when I am with other boys and girls my age and I don't know what we will be doing		
It frustrates me when unexpected things happen when I am with other kids		
Intolerance of Uncertainty- Test	.85	3.22 (1.45)
It bugs me when I don't know what to expect on an upcoming test		
It bothers me when I don't know what questions will be on a test		
It really frustrates me when there are questions that I did not expect on a test		
It annoys me when I don't know if I have done well or badly on a test		
Worry- Social	.87	2.52 (1.42)
I often worry that other students in my class do not like me		
When I have to work with someone in my class, I worry that we won't get along		
When I meet someone new, I worry that this new person will not like me		
When I am with others, I worry that I will do something embarrassing		
When I have to work with someone in my class, I worry that it will not go well		
Worry- Test	.88	3.16 (1.48)
I often worry that I will get a bad grade on a test		
Before a test, I can't stop worrying that I will do badly on it		
I worry a lot about getting bad grades on my report card		
When I am writing a test, I worry that some of my answers might be wrong		
Arousal- Social	.88	1.71 (1.10)
When I am with other kids in my class I feel nervous		
I feel stressed when I am with other kids my age		
Sometimes when I am with others I feel nervous and my heart beats really fast		
I get stomach aches when I am around other kids my age		
Arousal- Test	.85	2.69 (1.46)
Before I take a test, I feel nervous		
After I take a test, I feel very tense		
My heart beats really fast when I have to take a test		
When I am writing a test, I get so nervous that I can't concentrate		

Table 2. Descriptive Statistics for Anxiety Self-Report Measures (Time 2)

Items	Cronbach's α	*M* (SD)
Intolerance of Uncertainty- Social	.77	2.33 (1.30)
It bothers when I am with other boys and girls my age and I don't know what we will be doing		
It bugs me when I am with other boys and girls my age and I don't know what we will be doing		
It frustrates me when unexpected things happen when I am with other kids		
Intolerance of Uncertainty- Test	.84	3.15 (1.43)
It bugs me when I don't know what to expect on an upcoming test		
It bothers me when I don't know what questions will be on a test		
It really frustrates me when there are questions that I did not expect on a test		
It annoys me when I don't know if I have done well or badly on a test		
Worry- Social	.84	2.59 (1.39)
I often worry that other students in my class do not like me		
When I have to work with someone in my class, I worry that we won't get along		
When I meet someone new, I worry that this new person will not like me		
When I am with others, I worry that I will do something embarrassing		
When I have to work with someone in my class, I worry that it will not go well		
Worry- Test	.88	3.19 (1.47)
I often worry that I will get a bad grade on a test		
Before a test, I can't stop worrying that I will do badly on it		
I worry a lot about getting bad grades on my report card		
When I am writing a test, I worry that some of my answers might be wrong		
Arousal- Social	.86	1.84 (1.20)
When I am with other kids in my class I feel nervous		
I feel stressed when I am with other kids my age		
Sometimes when I am with others I feel nervous and my heart beats really fast		
I get stomach aches when I am around other kids my age		
Arousal- Test	.86	2.79 (1.46)
Before I take a test, I feel nervous		
After I take a test, I feel very nervous/tense		
My heart beats really fast when I have to take a test		
When I am writing a test, I get so nervous that I can't concentrate		

Table 3. Descriptive Statistics for Depressed Affect Self-Report Measures (Time 1 and Time 2)

Items	*Time 1*		*Time 2*	
	Cronbach's α	*M* (SD)	Cronbach's α	*M* (SD)
Depressed Affect	.82	2.23 (1.20)	.88	2.07 (1.35)
I feel lonely				
I feel sad				
I feel unhappy				

Table 4. Descriptive Statistics for Friendship Quality Measures (Time 1)

Items	Cronbach's α	*M* (SD)
Security	.78	4.15 (1.06)
If my friend or I do something that bothers the other one of us, we can make up easily		
If my friend and I have a fight or an argument we can say "I'm sorry" and everything will be alright		
I am sure that this friendship will last for a long time		
Even if other persons stopped liking me, my friend would still be my friend		
Intimacy	.88	3.89 (1.27)
I can talk to my friend about everything that is on my mind		
If there is something bothering me, I can tell my friend about it even if it is something that I cannot tell other people		
My friend knows what I really think about things		
My friend knows my real feelings about things in my life		

Results

Factor Structure of IU, Worry, and Arousal in Social and Test Domains

The first set of analyses evaluated the underlying factor structure of our newly developed measures of anxiety. All missing data (n = 2) were removed from the analysis given that there was no evidence that these two participants represented a distinct subset of the population. Four confirmatory factor analyses (CFA) were conducted with Mplus (Muthén & Muthén, 2010). In each model, three latent variables were created to represent the 3 separate anxiety constructs: (a) IU, (b) worry, (c) and arousal. Model fit was assessed using several fit indices including Chi-square test of model fit, the comparative fit index (CFI), the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Hu and Bentler (1999) suggest cutoff scores of 0.95 for CFI and TLI, 0.06 for RMSEA, and 0.08 for SRMR.

The first two CFAs evaluated the anxiety measures in the social domain at Time 1 (see Figure 1) and Time 2 (see Figure 2). At Time 1, the CFA model showed a good level of fit (χ^2 (53) = 57.39, p = 0.32, CFI = 0.99, TLI = 0.99, RMSEA = 0.02 (0.00-0.05), SRMR = 0.05). At Time 2, the CFA model showed a similar level of fit (χ^2 (52) = 83.60, p < 0.001, CFI = 0.95=8, TLI = 0.97, RMSEA = 0.05 (0.03-0.07), SRMR = 0.05). The third and fourth CFAs were used to evaluate the 3 anxiety measures in the test domain of functioning at Time 1 (see Figure 3) and Time 2 (see Figure 4). The model at Time 1 showed a good level of fit to the data (χ^2 (52) = 81.29, p = 0.01, CFI = 0.98, TLI = 0.98, RMSEA = 0.05 (0.03-0.07), SRMR = 0.07), as did the model at Time 2 (χ^2 (52) = 98.76, p < 0.001, CFI = 0.97, TLI = 0.97, RMSEA = 0.06 (0.04-0.08), SRMR = 0.10). The covariances between each of the latent factors at each time, in their respective domains, are also illustrated in Figures 1 to 4.

Within-Time Associations Between Anxiety Constructs

The purpose of the second set of analyses was to assess the degree to which the different components of anxiety predict one another, and the degree to which they predict depressed affect within each time. The data were analyzed using structural equation modeling with MPlus (Muthén & Muthén, 2010).

Social domain. An initial model examined the associations between the Time 1 latent measures in the social domain. IU was represented as an antecedent to both worry and arousal, which in turn were represented as predictors of depressed affect. This model was observed to

have a good level of fit (χ^2 (85) = 124.50, $p < 0.001$, CFI = 0.98, TLI = 0.97, RMSEA = 0.05 (0.03-0.06), SRMR = 0.07). In this model, IU significantly predicted worry (standardized coefficient = 0.56, $t = 8.95$, $p < 0.001$), arousal (standardized coefficient = 0.51, $t = 8.64$, $p < 0.001$) and depressed affect (standardized coefficient = 0.38, $t = 5.81$, $p < 0.001$). The path from the measure of worry to the measure of depressed affect was observed to be statistically significant (standardized coefficient = 0.39, $t = 4.19$, $p < 0.001$), as was the coefficient for the path from the measure of arousal to the measure of depressed affect (standardized coefficient = 0.25, $t = 2.60$, $p = 0.01$). Similar findings were replicated with the Time 2 measures. IU significantly predicted worry (standardized coefficient = 0.59, $t = 13.23$, $p < 0.001$), arousal (standardized coefficient = 0.61, $t = 15.44$, $p < 0.001$) and depressed affect (standardized coefficient = 0.65, $t = 15.75$, $p < 0.001$). Also, the coefficient for the path from the measure of worry to the measure of depressed affect was observed to be statistically significant (standardized coefficient = 0.44, $t = 6.14$, $p < 0.001$), as was the coefficient for the path from the measure of arousal to the measure of depressed affect (standardized coefficient = 0.34, $t = 4.36$, $p < 0.001$). Figure 5 demonstrates the within-time effects at both times in the social domain.

Indirect associations. An indirect model was specified to examine the pathways in which IU indirectly predicted depressed affect in the social domain. This model assessed the indirect associations between the measure of IU and depressed affect via the measure of worry, as well as the indirect association between the measure of IU and depressed affect, via the measure of arousal, at both times. At Time 1, analyses revealed that IU was indirectly related to depressed affect through both worry (standardized coefficient = 0.22, $t = 3.86$, $p < 0.001$) and arousal (standardized coefficient = 0.13, $t = 2.59$, $p = 0.01$). In the same way, IU was indirectly related to depressed affect via worry (standardized coefficient = 0.26, $t = 5.09$, $p < 0.001$) and via arousal (standardized coefficient = 0.21, $t = 4.60$, $p < 0.001$) at Time 2.

Test domain. In the next analyses, a predictive model was assessed with the measures in the test domain at Time 1. This model was observed to have a good level of fit χ^2 (76) = 94.58, $p = 0.07$, CFI = 0.99, TLI = 0.99, RMSEA = 0.03 (0.00-0.05), SRMR = 0.05). At Time 1, IU significantly predicted worry (standardized coefficient = 0.63, $t = 14.88$, $p < 0.001$), arousal (standardized coefficient = 0.61, $t = 13.53$, $p < 0.001$) and depressed affect (standardized coefficient = 0.34, $t = 5.43$, $p < 0.001$). The coefficient for the path from the measure of worry to the measure of depressed affect was also observed to be statistically significant (standardized

coefficient = 0.38, $t = 3.37$, $p < 0.001$). The coefficient for the path from the measure of arousal to the measure of depressed affect (standardized coefficient = 0.06, $p = 0.62$) was statistically nonsignificant. Similarly, at Time 2, IU significantly predicted worry (standardized coefficient = 0.73, $t = 24.99$, $p < 0.001$), arousal (standardized coefficient = 0.71, $t = 21.61$, $p < 0.001$) and depressed affect (standardized coefficient = 0.42, $t = 7.63$, $p < 0.001$). The coefficients for the paths from the measures of worry and arousal to the measure of depressed affect were statistically nonsignificant (standardized coefficients = 0.14, $p = 0.66$; standardized coefficient = 0.36, $p = 0.25$, respectively). Figure 6 demonstrates the within-time effects at both times in the test domain.

Indirect associations. Next, the indirect associations between the measure of IU and depressed affect via the measure of worry, as well as the indirect association between the measure of IU and depressed affect, via the measure of arousal, were examined at both times. In the test domain at Time 1, our analyses revealed that IU was indirectly related to depressed affect through worry (standardized coefficient = 0.24, $t = 3.22$, $p < 0.001$), but not through arousal (standardized coefficient = 0.04, $p = 0.62$). At Time 2, the indirect effects of IU on depressed affect via worry (standardized coefficient = 0.10, $p = 0.66$) and arousal (standardized coefficient = 0.25, $p = 0.25$) were observed to be statistically nonsignificant.

Across-Time Effects

Stability (social domain). The degree of stability between the Time 1 and Time 2 measures of IU, worry, arousal and depressed affect in the social domain was assessed. The autocorrelations between the T1 and T2 measures of IU (standardized coefficient = 0.57, $t = 10.50$, $p < 0.001$), worry (standardized coefficient = 0.65, $t = 13.33$, $p < 0.001$), arousal (standardized coefficient = 0.70, $t = 16.61$, $p < 0.001$) and depressed affect (standardized coefficient = 0.70, $t = 16.09$, $p < 0.001$) indicated that these measures were stable over time (dotted lines in Figure 5).

Stability (test domain). The degree of stability between the Time 1 and Time 2 measures of IU, worry, arousal and depressed affect in the test domain was assessed. The autocorrelations between the T1 and T2 measures of IU (standardized coefficient = 0.62, $t = 12.07$, $p < 0.001$), worry (standardized coefficient = 0.75, $t = 19.47$, $p < 0.001$), arousal (standardized coefficient = 0.84, $t = 24.82$, $p < 0.001$) and depressed affect (standardized coefficient = 0.70, $t = 15.86$, $p < 0.001$) indicated that these measures were also stable over time (dotted lines in Figure 6).

Effects of Friendship Quality

The third goal of the present study was to determine whether specific aspects of friendship quality, namely security and intimacy, moderated the stability of anxiety across time. Analyses were conducted in order to assess the degree to which Time 1 levels of friendship security and intimacy interacted with initial levels of IU, worry and arousal to predict anxiety at Time 2. In addition to the univariate effects of security and intimacy, 6 additional latent constructs were created to represent the interaction scores at Time 1. These were: (a) IU by Security, (b) IU by Intimacy, (c) Worry by Security, (d) Worry by Intimacy, (e) Arousal by Security, and (f) Arousal by Intimacy. Six separate sets of analyses were conducted to evaluate each measure of anxiety separately across time (IU, worry, arousal), and across both domains of functioning (social, test).

Friendship quality on IU. The first analysis considered the effects of friendship security and intimacy on the stability of IU in the social domain. This model included five direct paths: (a) T1 Security on T2 IU, (b) the interaction score between T1 IU and T1 Security on T2 IU, (c) T1 IU on T2 IU, (d) the interaction score between T1 IU and T1 Intimacy on T2 IU, and (e) T1 Intimacy on T2 IU (see Figure 7). Time 1 security negatively, and significantly predicted levels of IU at Time 2 (standardized coefficient = -0.39, t = -2.36, p = 0.01), as did the interaction term between Time 1 security and Time 1 IU (standardized coefficient = -0.23, t = -1.69, p = 0.05). With regards intimacy, Time 1 intimacy did not significantly predict T2 IU (standardized coefficient = 0.27, t = 1.86, p = 0.06), nor did the interaction between Time 1 intimacy and Time 1 IU (standardized coefficient = 0.12, t = 1.01, p = 0.31). Initial levels of IU also significantly predicted levels of IU at Time 2 (standardized coefficient = 0.53, t = 9.55, p < 0.001).

In the test domain (see Figure 8), however, the effects of Time 1 security (standardized coefficient = 0.09, t = 0.57, p = 0.29) and Time 1 intimacy (standardized coefficient = -0.13, t = -0.97, p = 0.33). on Time 2 levels of IU were found to be statistically nonsignificant. In the same way, the interactions between Time 1 security and Time 1 IU (standardized coefficient = 0.11, t = 0.85, p = 0.20) and Time 1 intimacy and Time 1 IU (standardized coefficient = -0.01, t = -0.07, p = 0.95) on Time 2 levels of IU were also found to be statistically nonsignificant. Time 1 levels of IU significantly predicted levels of IU at Time 2 in the test domain (standardized coefficient = 0.61, t = 11.66, p < 0.001).

Friendship quality on worry. Next, the effects of friendship security and intimacy on the stability of worry in both domains were examined. Five direct paths were included in this model: (a) T1 security on T2 Worry, (b) the interaction score between T1 Worry and T1 Security on T2 Worry, (c) T1 Worry on T2 Worry, (d) the interaction score between T1 Worry and T1 Intimacy on T2 Worry, and (e) T1 Intimacy on T2 Worry. In the social domain (see Figure 9), Time 1 security did not significantly predict worry at Time 2 (standardized coefficient = -0.22, t = -1.43, p = 0.08), nor did the interaction term between Time 1 security and Time 1 worry (standardized coefficient = 0.06, t = 0.44, p = 0.33). With regards intimacy, Time 1 intimacy did not significantly predict T2 worry (standardized coefficient = 0.18, t = 1.30, p = 0.19), nor did the interaction between Time 1 intimacy and Time 1 worry (standardized coefficient = -0.09, t = -0.83, p = 0.41). Initial levels of worry significantly predicted levels of worry at Time 2 (standardized coefficient = 0.62, t = 12.84, p < 0.001).

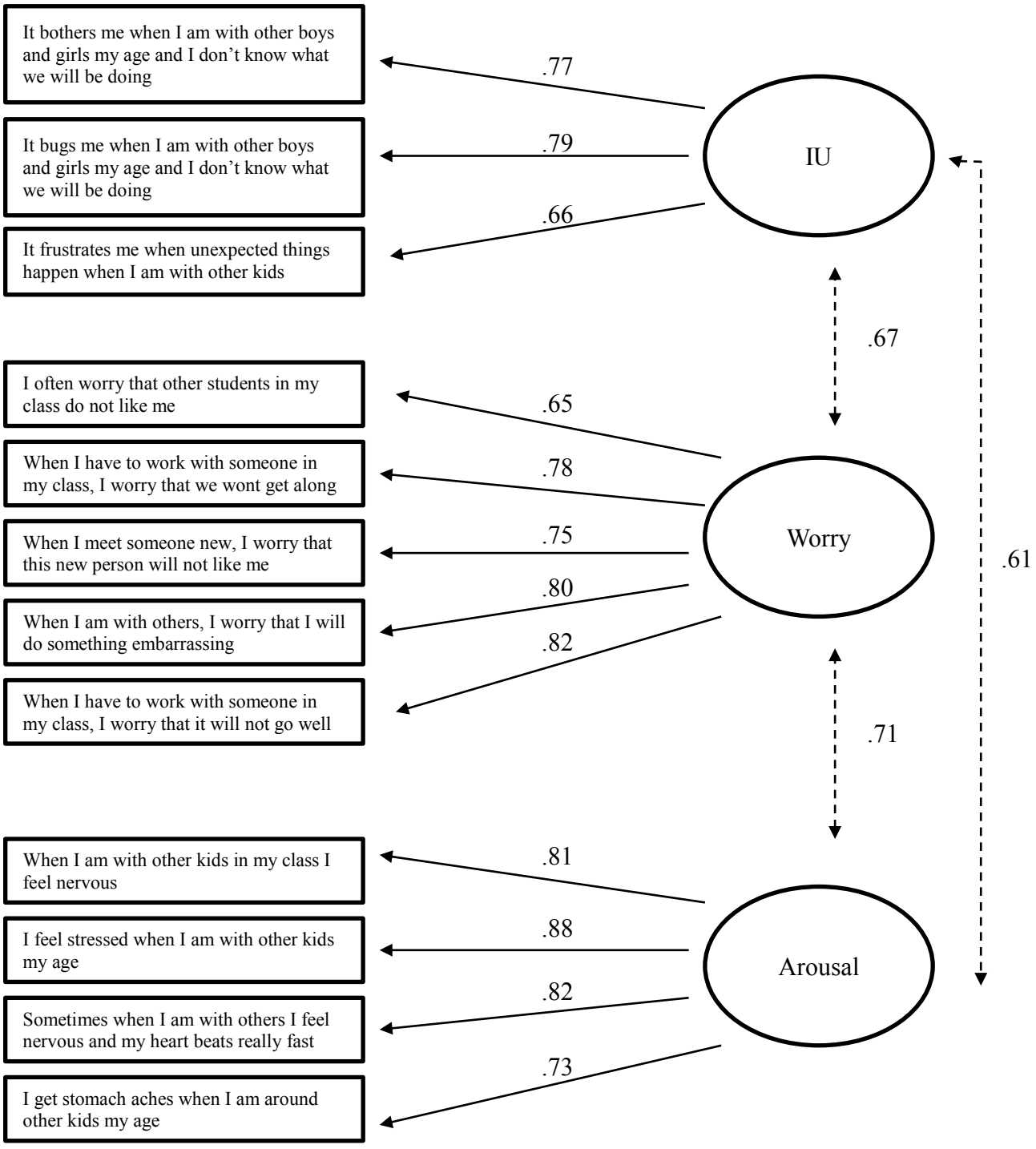
In the test domain (see Figure 10), the effects of Time 1 security (standardized coefficient = 0.01, t = 0.07, p = 0.47) and Time 1 intimacy (standardized coefficient = -0.05, t = -0.48, p = 0.63) on Time 2 levels of worry were found to be statistically nonsignificant. Similarly, the interactions between Time 1 security and Time 1 worry (standardized coefficient = -0.04, t = -0.36, p = 0.36) and Time 1 intimacy and Time 1 worry (standardized coefficient = 0.03, t = 0.28, p = 0.78) on Time 2 levels of worry were also statistically nonsignificant. Time 1 levels of worry significantly predicted levels of worry at Time 2 in the test domain (standardized coefficient = 0.69, t = 19.57, p < 0.001).

Friendship quality on arousal. Finally, the effects of friendship security and intimacy on the stability of arousal in both domains were assessed via five direct paths: (a) T1 Security on T2 Arousal, (b) the interaction score between T1 Arousal and T1 Security on T2 Arousal, (c) T1 Arousal on T2 Arousal, (d) the interaction score between T1 Arousal and T1 Intimacy on T2 Arousal, and (e) T1 Intimacy on T2 Arousal. In the social domain (see Figure 11), Time 1 security negatively and significantly predicted arousal at Time 2 (standardized coefficient = -0.37, t = -3.09, p < 0.001), as did the interaction term between Time 1 security and Time 1 arousal (standardized coefficient = -0.40, t = 3.84, p < 0.001). With regards intimacy, Time 1 intimacy significantly predicted T2 arousal (standardized coefficient = 0.21, t = 1.95, p = 0.05) and the interaction between Time 1 intimacy and Time 1 arousal significantly predicted Time 2

arousal (standardized coefficient = 0.26, $t = 2.75$, $p = 0.01$). Initial levels of arousal significantly predicted levels of arousal at Time 2 (standardized coefficient = 0.55, $t = 10.39$, $p < 0.001$).

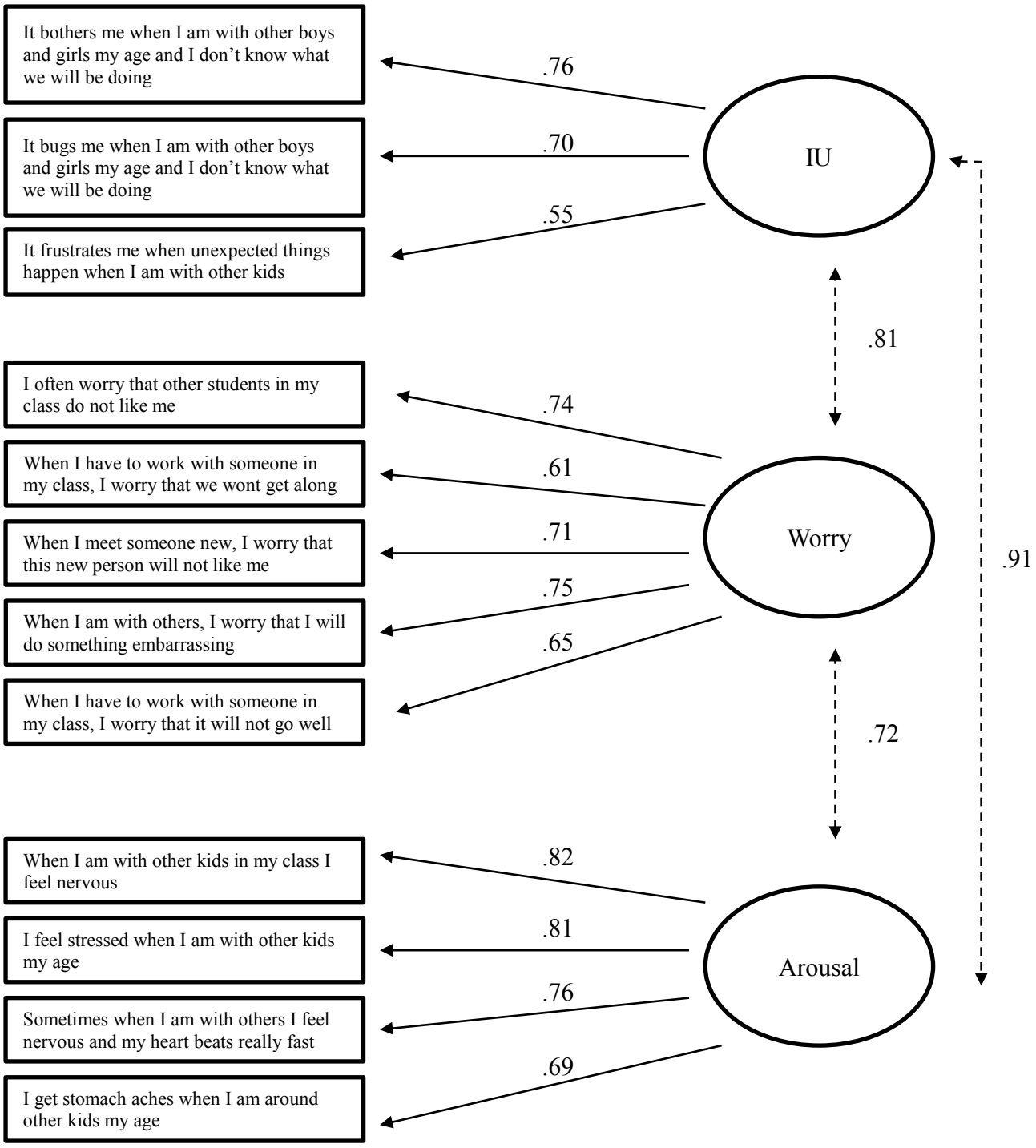
In the test domain (see Figure 12), the effects of Time 1 security (standardized coefficient = -0.004, $t = -0.03$, $p = 0.49$) and Time 1 intimacy (standardized coefficient = -0.04, $t = -0.35$, $p = 0.72$) on Time 2 levels of arousal were found to be statistically nonsignificant. In the same way, the interaction between Time 1 security and Time 1 arousal (standardized coefficient = 0.01, $t = 0.07$, $p = 0.47$) and the interaction between Time 1 intimacy and Time 1 arousal (standardized coefficient = -0.01, $t = -0.15$, $p = 0.88$) on Time 2 levels of arousal was also found to be statistically nonsignificant. Time 1 levels of arousal significantly predicted levels of arousal at Time 2 in the test domain (standardized coefficient = 0.71, $t = 20.73$, $p < 0.001$).

Figure 1. CFA for Anxiety Measures at Time 1 in the Social Domain.



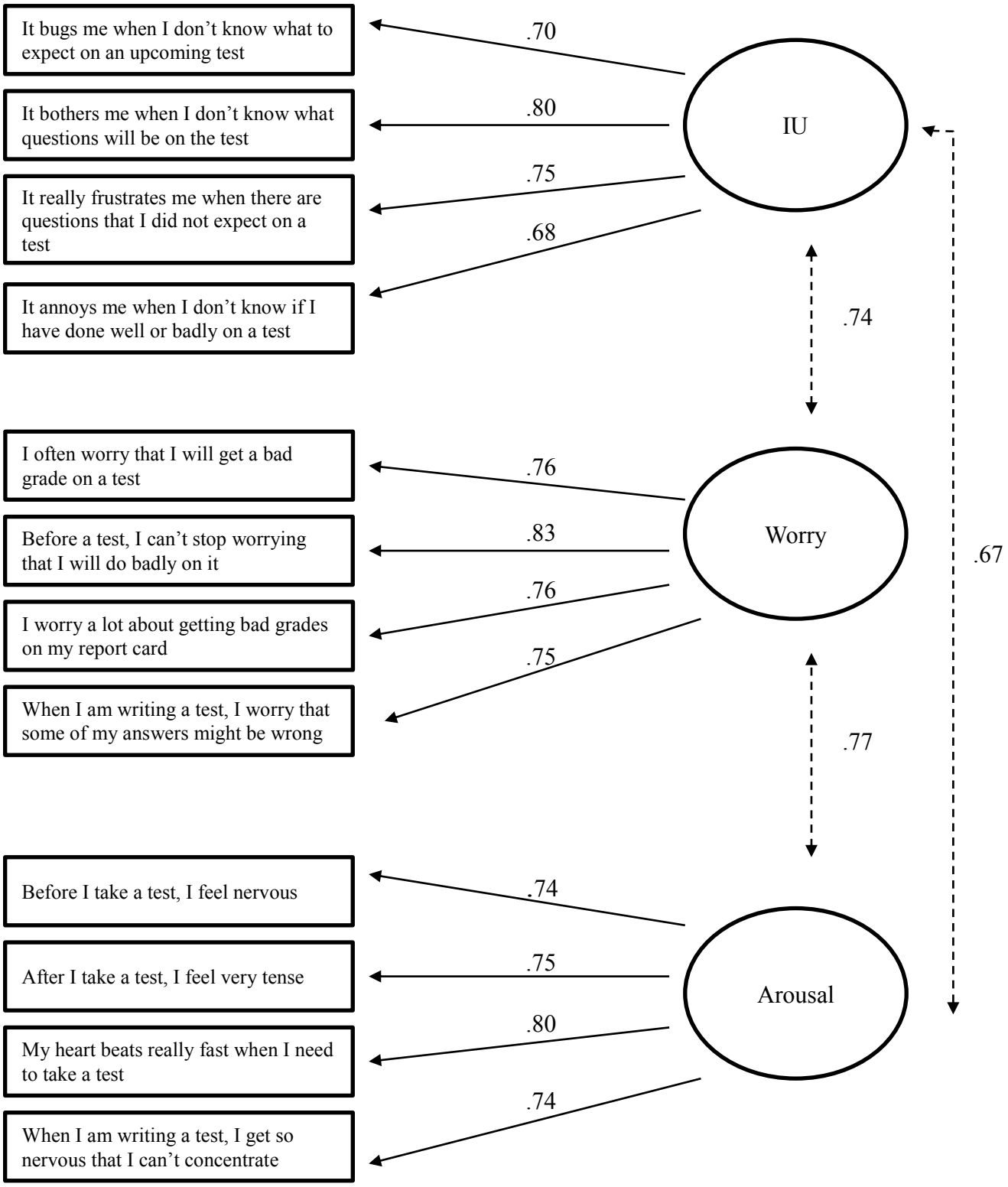
Note. All paths were significant at $p < .05$

Figure 2. CFA for Anxiety Measures at Time 2 in the Social Domain.



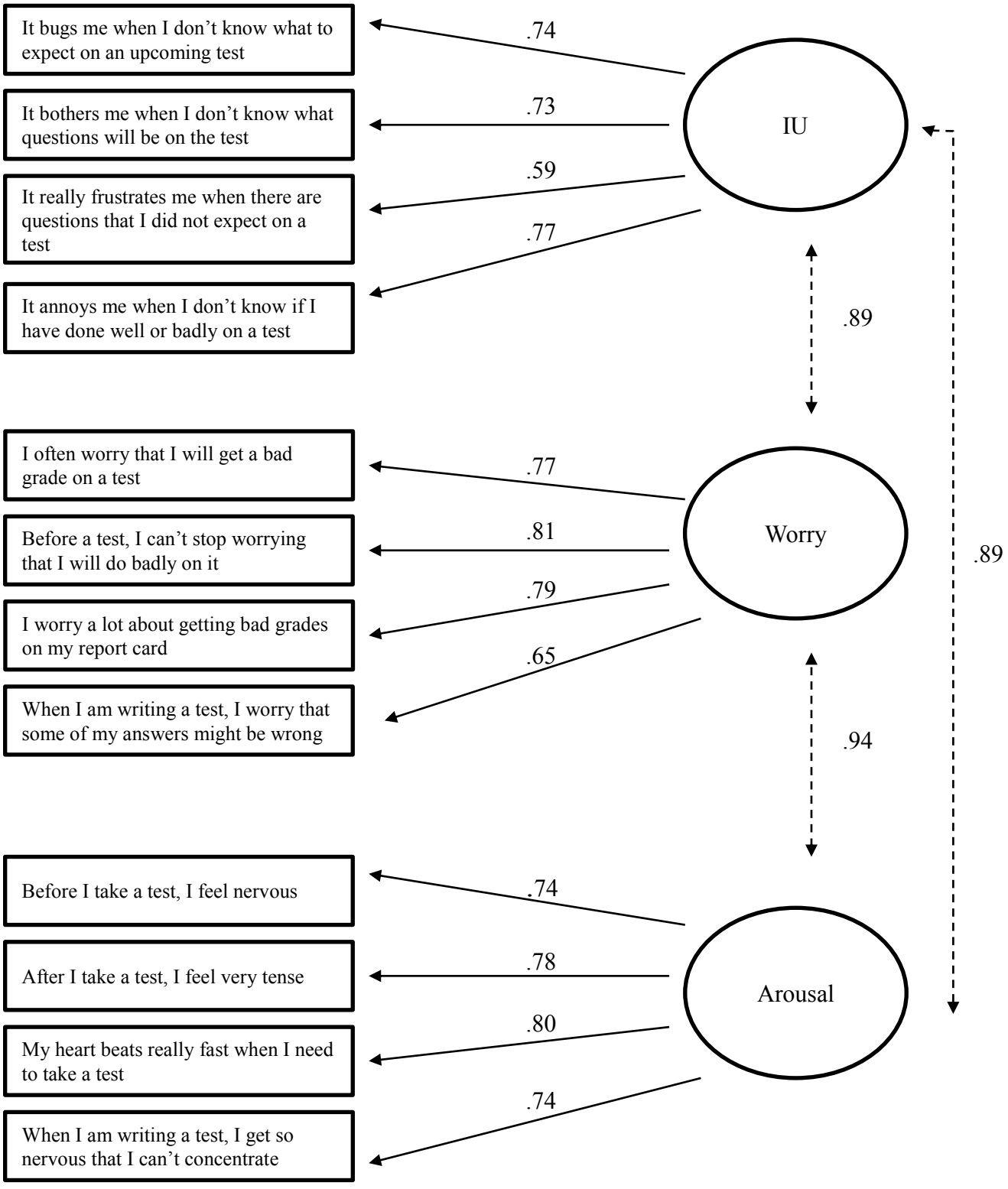
Note. All paths were significant at $p < .05$

Figure 3. CFA for Anxiety Measures at Time 1 in the Test Domain



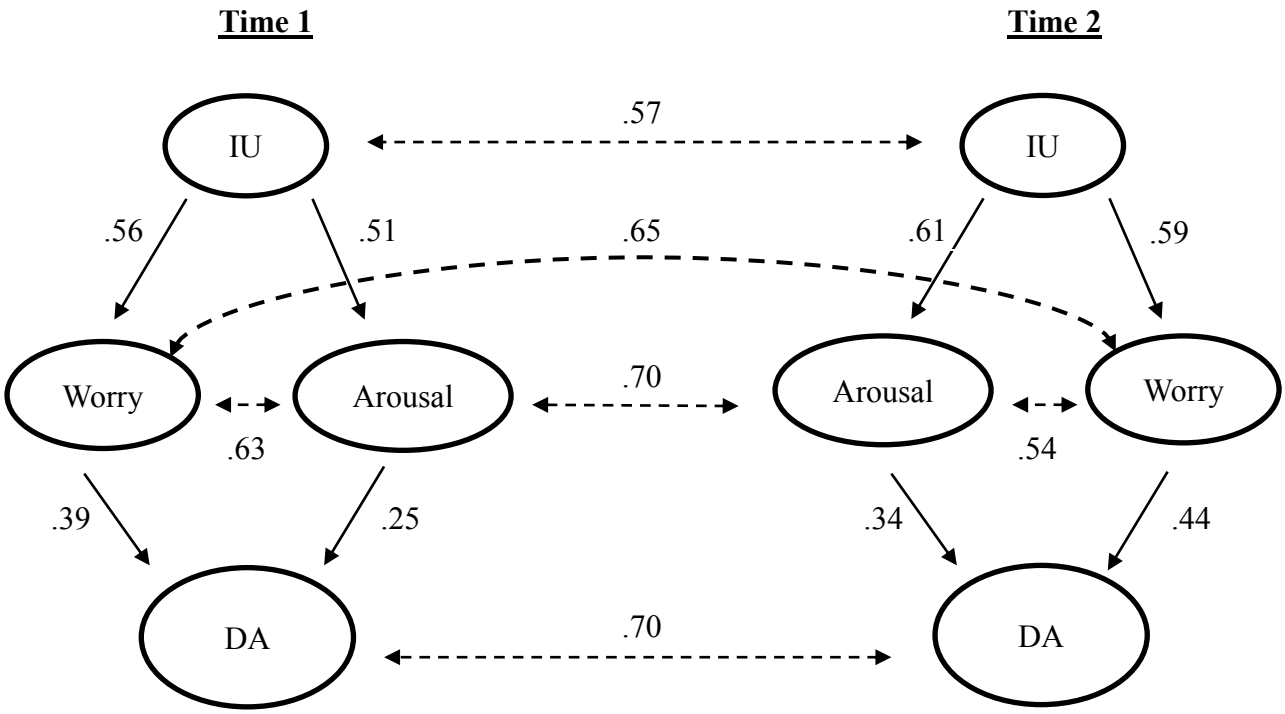
Note. All paths were significant at $p < .05$

Figure 4. CFA for Anxiety Measures at Time 2 in the Test Domain



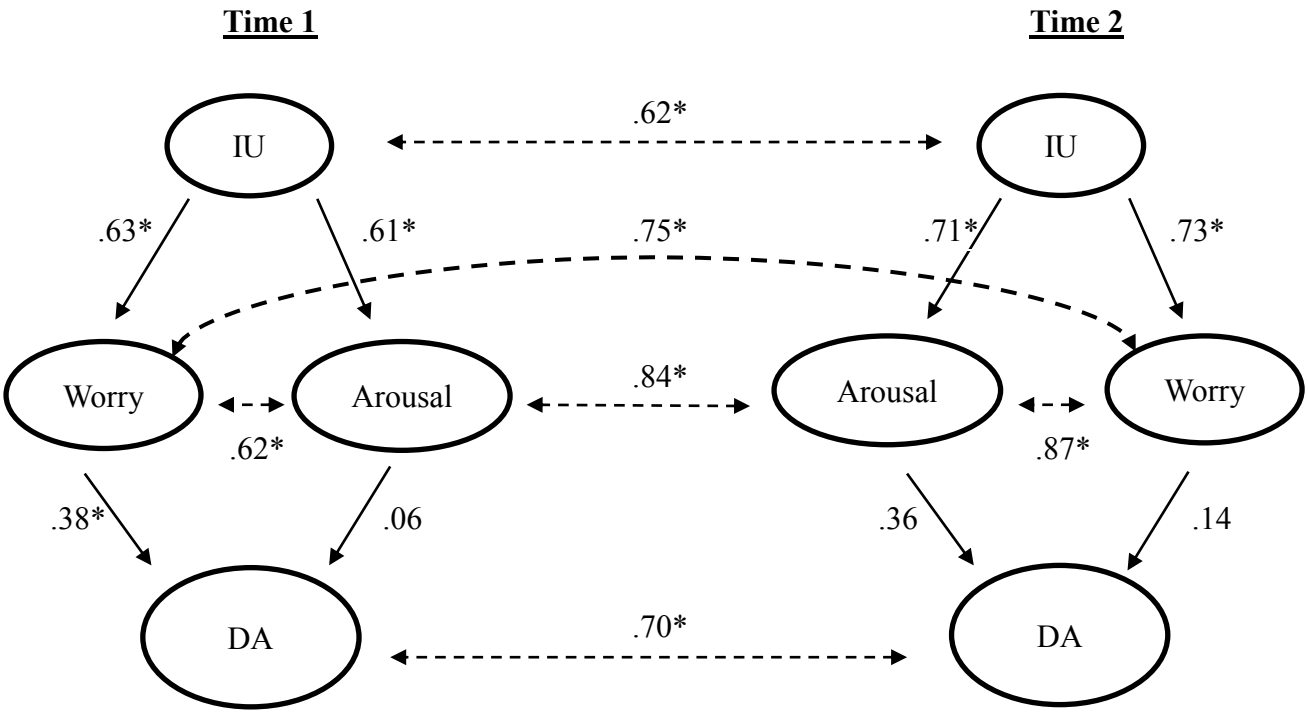
Note. All paths were significant at $p < .05$

Figure 5. Within-Time Effects – Social Domain.



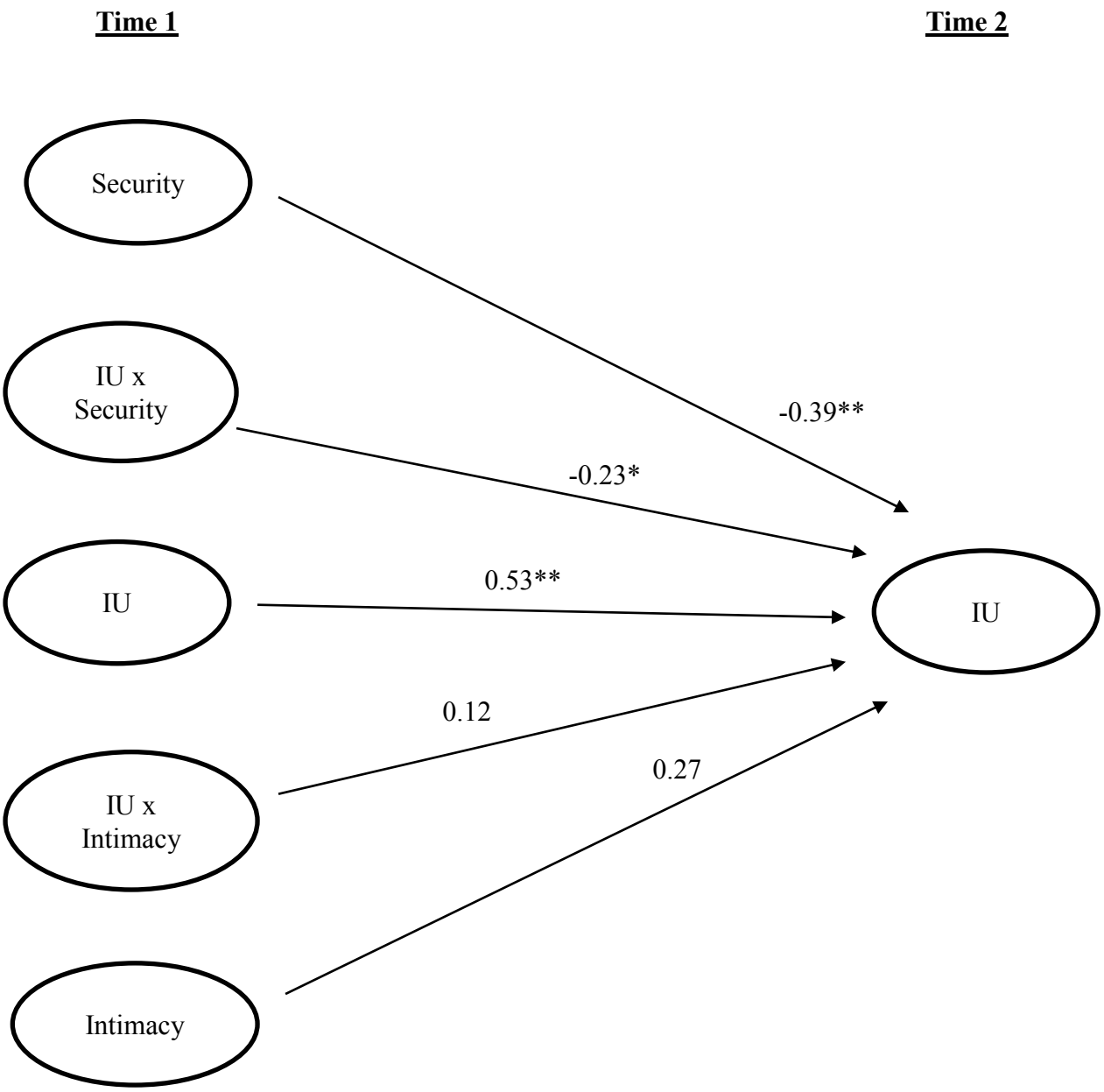
Note. All paths were significant at $p < .05$

Figure 6. Within-Time Effects – Test Domain.



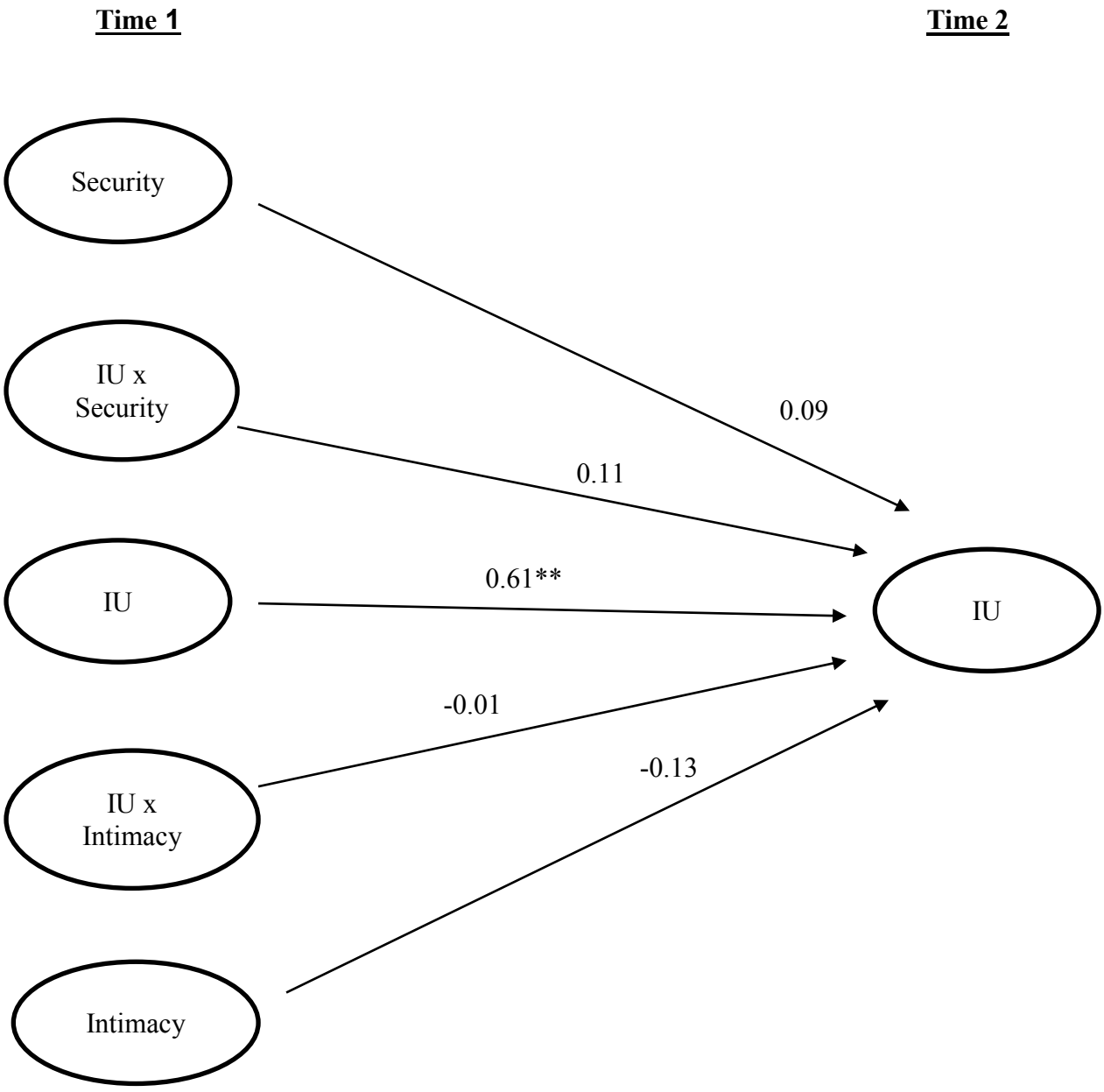
Note. *$p < .05$

Figure 7. Effects of Friendship Quality on IU Across Time (Social Domain).



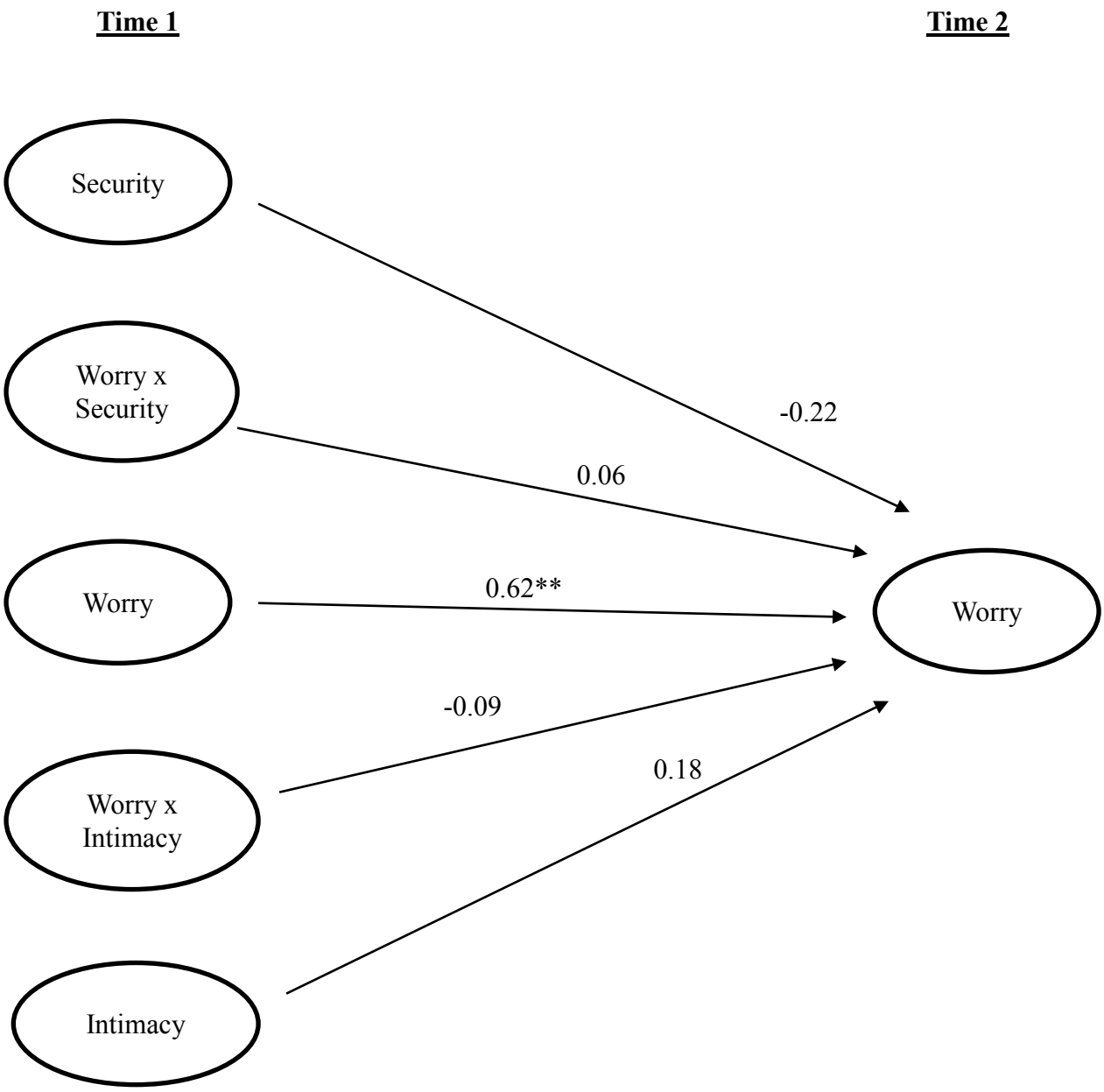
Note. $^{**}p < .01$; $^{*}p < .05$

Figure 8. Effects of Friendship Quality on IU Across Time (Test Domain).



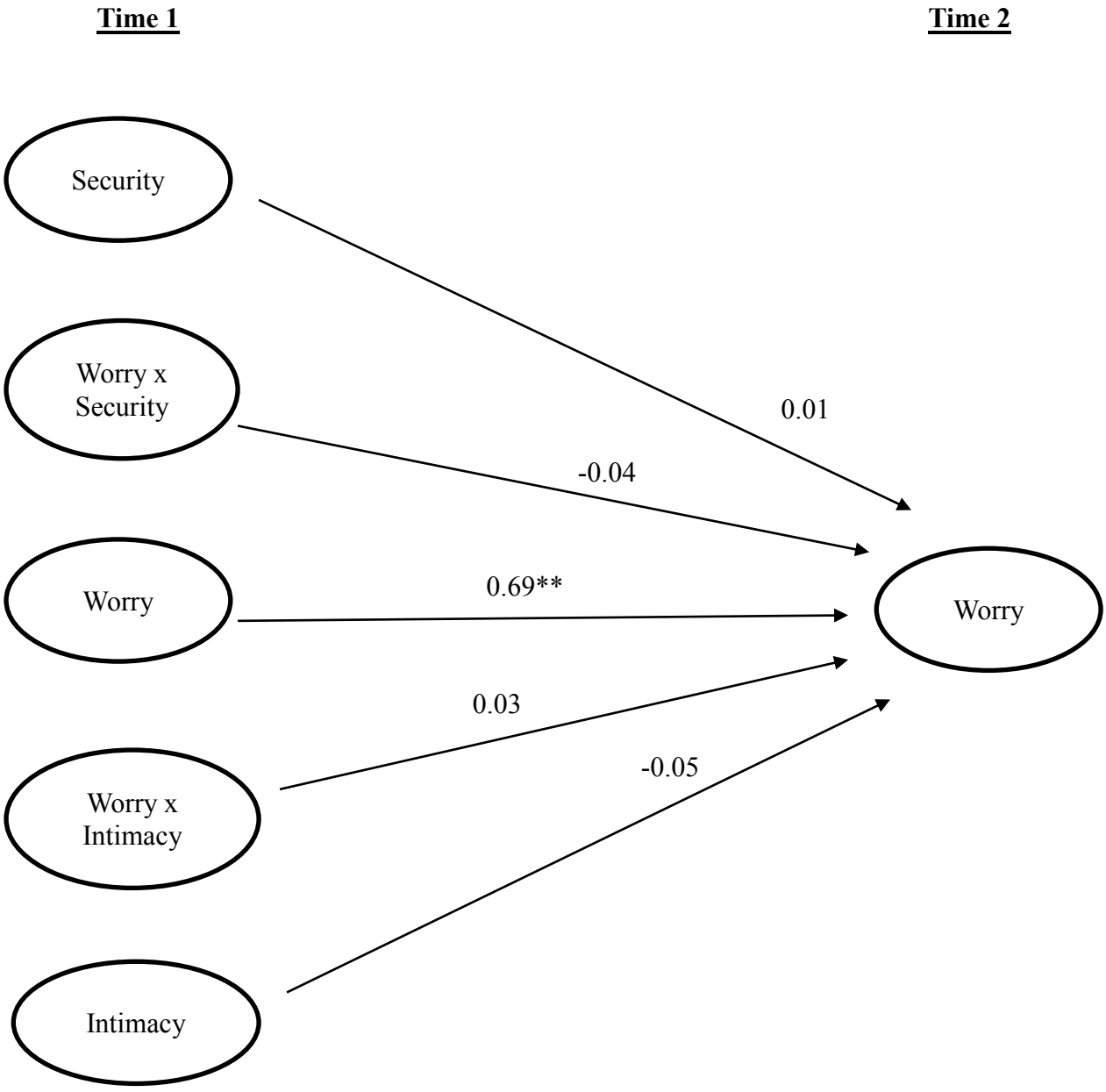
Note. $^{**}p < .01$; $^{*}p < .05$

Figure 9. Effects of Friendship Quality on Worry Across Time (Social Domain).



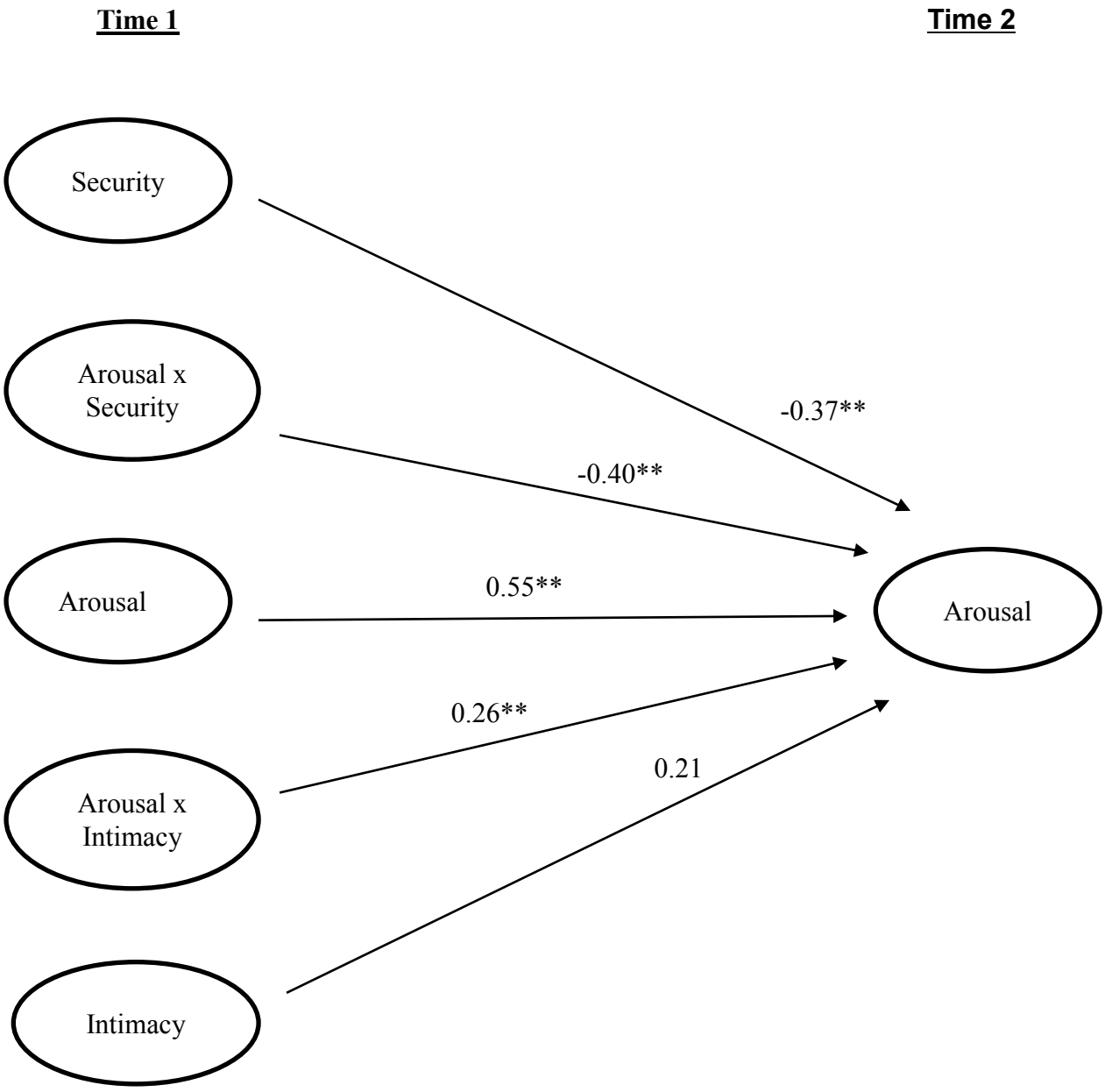
Note. $^{**}p < .01$; $^{*}p < .05$

Figure 10. Effects of Friendship Quality on Worry Across Time (Test Domain).



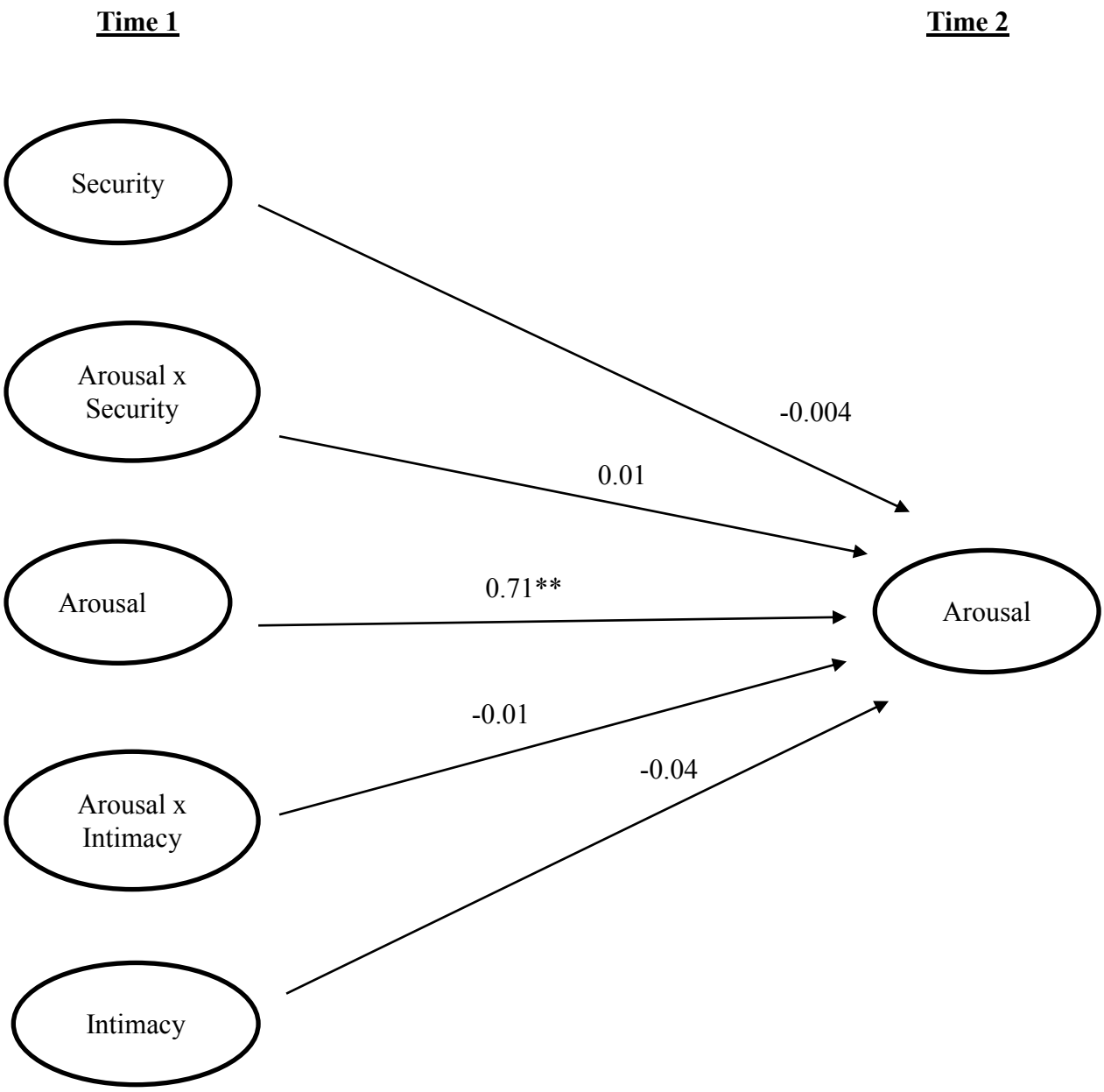
Note. $^{**}p < .01$; $^{*}p < .05$

Figure 11. Effects of Friendship Quality on Arousal Across Time (Social Domain).



Note. $^{**}p < .01$; $^{*}p < .05$

Figure 12. Effects of Friendship Quality on Arousal Across Time (Test Domain).



Note. $^{**}p < .01$; $^{*}p < .05$

Discussion

The primary aims of this study were to offer unique insights into the associations between cognitive and physiological components of anxiety in preadolescents, and to examine the longitudinal effects of friendship security and intimacy on feelings of anxiety. Using a newly developed measure of anxiety, the current study assessed the functional associations between the individual components of anxiety and depressed affect. The findings from this study suggested that this new tool proved to be a valid and reliable measure of the anxiety constructs (IU, worry, and arousal). Each item clustered with its predefined construct, and there were no items that loaded onto multiple factors. As such, this measure was used to assess the associations between the anxiety components across two separate time points, and within the social and test contexts. Furthermore, by employing a longitudinal design, the present study also examined the degree to which each of the components of anxiety was impacted by friendship security and intimacy over time.

First, it was hypothesized that IU and worry would be more strongly related to one another than either one was to the arousal component at both times. Our analyses revealed moderate to strong positive correlations between the anxiety components within each time. Specifically, in the social domain, worry and arousal were more strongly related to one another than either one was to IU at Time 1 only, but not at Time 2. Within Time 2, the association between IU and arousal was the strongest. Similarly, in the test domain, worry and arousal had the strongest association at both times. With the exception of the social domain at T2, it appears as though worry and arousal demonstrate the strongest association among the 3 anxiety components. As such, our initial hypothesis was not supported. It is possible that the worry and arousal components are so highly related given that they are both outcomes of IU. Interestingly, although the components showed moderate to strong correlations with one another at each time and within each domain, it appeared that the associations between the components became stronger over time. One possible explanation for this finding is perhaps that as the school year progresses, anxiety becomes more concrete or solidified across individuals. Given that IU and other symptoms of anxiety are known to remain relatively stable (Broeren et al., 2013), and that worry and arousal appear to be outcomes of IU, it is reasonable to expect that IU would exhibit a cascading effect, leading to higher levels of worry and arousal.

In addition, the hypothesis that IU would be a more powerful antecedent to worry than to arousal at both times was generally supported, in that this was the case at Time 1 in both the social and test domains, and at Time 2 in the test domain only. In the social domain at Time 2, the predictive path from IU to arousal was slightly stronger than the predictive path from IU to worry. The finding that IU is the most salient predictor of worry is well established in the literature in both clinical and non-clinical samples (Buhr & Dugas, 2009; Berenbaum, Bredemeier & Thompson, 2008; Khawaja & McMahon, 2011; Laugesen et al., 2003). Specifically, changes in IU during treatment have been associated with improvements in worry and overall levels of anxiety (Dugas & Ladouceur, 2000).

With regards to the indirect relationship between IU and depressed affect, we predicted that the indirect effect through worry would be stronger, as compared to the indirect effect via arousal. This hypothesis was made to replicate previous findings with an adult population (Dar, Iqbal, & Mushtaq, 2017). In the social domain, the indirect effects from IU to depressed affect via the components of worry and arousal were both found to be statistically significant at both times. As suspected, the indirect effect through worry was stronger at Time 1 and at Time 2, which provides further support for the findings of Dar and colleagues (2017). In the test domain, only the indirect effect via the component of worry was found to be significant at Time 1, whereas at Time 2, both of the indirect effects were found to be nonsignificant. Some have proposed that worry is similar to the ruminative process involved in depression (Nolen-Hoeksema, 1996), in that both involve repetitive, worrisome thinking, which maintains negative emotional states over time. Some studies have found that IU is associated with greater engagement in rumination and post-event processing (Liao & Wei, 2001; Shiktani, Antony, Cassin & Kuo, 2016), and that rumination is unable to predict depression after controlling for the effects of worry (Muris, Roelofs, Meesters, & Boomsma, 2004). As a result, it is evident that worry carries a significant proportion of the variance in predicting depressed affect. Given that the indirect associations between IU and depressed affect were not significant in the test domain, perhaps it can be suggested that interpersonal events (e.g., social loss, rejection) may lead to internalizing symptoms (e.g., depressed affect) to a greater degree as compared to achievement-related factors (Weidman, Augustine, Murayama & Elliot, 2015).

In order to expand on the work conducted by Wood and colleagues (2015), the second objective of the current study was to examine whether friendship security and intimacy

moderated the stability of each component of anxiety across time. Wood and associates found that the effects of security on reducing anxiety were stronger than the effects observed for intimacy. As such, it was hypothesized that friendship security, and not intimacy, would moderate the stability of anxiety, and that security would exhibit the strongest effect on IU. It was also predicted that security would be negatively associated with each component of anxiety over time, such that increases in friendship security would lead to decreases in anxiety at a later time. When comparing the models in which measures of friendship quality were absent (see Figures 5 and 6) and models in which security and intimacy were included as moderator variables (see Figures 7-12), it was evident the stability of each anxiety component from Time 1 to Time 2 decreased when friendship quality factors were present. This finding is critical in that understanding what factors can disrupt the stability of anxiety is essential for the prevention and treatment of anxiety in children.

Moreover, the results also revealed that in the social domain, security was negatively related to subsequent levels of IU and arousal, but not worry. Although the effects of intimacy were found to be nonsignificant, it is interesting to note that the majority of these effects were positive, which suggests that increased intimacy at an initial time may lead to increases in levels of IU and arousal. The finding that security is, in most cases, negatively related to anxiety at Time 2 is in line with what was initially hypothesized. Early adolescence is a transitional period in the lifespan that is characterized by cognitive, emotional and social changes, and increased levels of uncertainty (Nelemans et al., 2017). Given that friendship plays a central role in the lives of children and adolescents, it has the potential to significantly impact one's adjustment to these changes. The importance of security within a friendship is well established (Wood et al., 2015; Blatz, 1966). Friendship security, as it relates to this study, concerns the implicit awareness that one's friendship is stable and long-term, and that one can always count on their best friend to be there in times of need. As such, when uncertainty is present, a young adolescent is likely to seek reassurance from a secure source (e.g., a best friend), whose function is to provide some degree of certainty, thus helping one cope. Therefore, the finding that friendship security is negatively related to levels of IU over time is not unexpected.

On the other hand, the positive association found between intimacy and the various anxiety components suggests that intimacy may exacerbate feelings of anxiety over time in some youth rather than attenuate them. In this study, the construct of intimacy involved items related to

self-disclosure among friends. Although intimacy is characteristic of high quality friendships (e.g., Bukowski, Hoza & Boivin, 1994), it is possible that engaging in significant amounts of self-disclosure is similar to engaging in co-rumination, which is known to perpetuate negative mood states over time (Rose et al., 2007; Wood et al., 2015).

Another important finding is that the friendship effects were all found to be nonsignificant in the test domain. This suggests that friendship security and intimacy do not seem to have an effect on levels of IU, worry, and arousal in the test domain of functioning. It is possible that this is due to the nature of the items used in this study to assess the components of anxiety in the test domain. Each test item referred specifically to test-taking and feelings surrounding test performance and outcomes (e.g., "When I am writing a test […]; "After I take a test […]"), rather than to the broader academic context (e.g., test preparation strategies, approach to testing, etc.). Given that test-taking is an individualized experience, it may be that friendship does not play a prominent role in this domain. If the items had included questions relating to study groups, for example, perhaps a friendship effect would have been observed.

Strengths and Limitations

The present study is the first to investigate the functional association between multiple components of anxiety, including IU, in a large community sample of preadolescents. It provides preliminary support for the associations between IU, worry, arousal, and depressed affect using a new valid and reliable measure of anxiety. The development of this measure allowed for the investigation of how multiple dimensions of anxiety are differentially affected by the social and test contexts. Items were written in a developmentally appropriate manner, and in a way that was as simplistic as possible in order to facilitate translation in the future for work conducted with different language and cultural groups. Moreover, the use of a longitudinal design allowed us to not only assess the stability of each anxiety component across time, but also to examine the degree to which friendship security and intimacy may influence that stability. Some have proposed that identifying patterns of IU in young samples can be an important indicator of problematic anxiety because what differentiates normative development from nonnormative development is an increased ability to tolerate uncertainty (Comer et al., 2009). Accordingly, it is crucial to evaluate the stability of IU in order to understand this developmental trajectory that can be a risk factor for excessive worry (Comer et al., 2009).

Also, the finding that supports the importance of friendship security provides unique evidence that brings together the friendship and anxiety literature. This study is the first to assess the degree to which physiological and cognitive components of anxiety are differentially affected by specific friendship features over time, which can inform treatment and intervention planning for youth with anxiety. Building on previous work (Wood et al., 2015), the current study proposes that IU is indeed a higher order vulnerability factor for worry and arousal, and importantly, it identifies IU as being the component that is most likely to be the first target of friendship factors.

Although this study has a number of strengths, there are two limitations that should be considered. The first concerns two self-report items that were used to assess levels of the IU in the social domain. It can be seen that two items are nearly identical, with the exception of the words “bugs” versus “bothers”. Although it would have been preferable to exclude one of these items and replace it with another, the decision to retain both items stemmed from the fact that both items loaded well onto the overall factor of IU in the social domain compared to other items that were being considered. As such, this measure is open to modifications in the future. Second, it is possible that time of year effects could have had an impact. Specifically, we did not assess or control for external factors that may have influenced levels of anxiety. For instance, perhaps students may have had a test the day prior to or following each data collection, which could have significantly impacted levels of anxiety in the test domain. Similarly, interpersonal events that take place in the school environment (e.g., play, bullying, group projects) could have also played a role. Thus, it is possible that levels of anxiety observed in this study were not entirely representative of how a child generally feels.

Future Directions

Anxiety symptoms are a common mental health problem for Canadian youth. In light of the findings from the present study, there are multiple avenues for future work. Although investigating the extent to which each component of anxiety predicts the other concurrently is the logical first step, an avenue for future research would be to examine these predictions longitudinally. Doing so would provide important information with respect to the role that IU plays in the maintenance of worry, arousal, and depressed affect over time in preadolescence. In addition, while a longitudinal design was used in this study, future studies would be better served to implement a design in which there is a greater interval between the two separate time points,

preferably at the beginning, middle, and end of the school year. One can speculate that feelings of anxiety may be more pronounced at the beginning of the school year versus at the end, given the increased number of uncertainties present as one begins a new academic year (e.g., different peers, teachers). Moreover, the present study revealed moderate to strong associations between the different anxiety components *within* each time. Despite demonstrating that friendship quality can have an effect on the stability of each component over time, it would be important for future investigations to assess how friendship quality at an initial time affects the strength of the relations between the anxiety components at a later time. Doing so would provide important information about the degree to which friendship quality may moderate these associations (perhaps minimizing them) over time. Theoretically, if IU is in fact a powerful antecedent to worry and arousal, positive friendship factors should weaken those associations.

Future work is also needed to examine how the current findings would differ across various groups. Previous evidence drawn from adults suggests that there would be gender differences in the measures of anxiety, in that levels of IU would be more elevated in girls compared to boys (Read et al., 2013). With regards to friendship quality, it is well known that the friendships of boys and girls differ on various dimensions of friendship quality, in that girls display higher levels of intimacy, emotional closeness and greater overall friendship quality (Rose et al., 2011). Lastly, Santo and colleagues (2013) have demonstrated that aspects of the self vary across contexts, in that social competence is more highly associated with self-worth among upper-middle class individuals, whereas cognitive competence is more highly associated with self worth among lower-middle class groups (Santo et al., 2013). As such, perhaps lower middle-class individuals would display higher scores on the measures of anxiety in the test domain (e.g., cognitive competence), whereas upper middle-class individuals would demonstrate higher scores on the items in the social domain of functioning.

Implications

The present findings are particularly relevant to both the theoretical and practical domain. Beyond providing further empirical support for the idea that IU is indeed a phenomenon that can be experienced in children as young as 10 years of age, the current study demonstrates favourable psychometric properties for a new measure of anxiety that is appropriate for this age group. This new measure serves as a brief tool that researchers can use to easily assess and distinguish between the various cognitive and physiological components of anxiety in a way that minimizes

participant burden. Furthermore, it allows one to be able to assess anxiety across two developmentally salient contexts, which can provide valuable information regarding individual differences in anxiety trajectories. More importantly, this study also adds to the growing literature on how friendships can offer protective benefits for well-being in early adolescence. Specifically, our findings highlight the significance of friendship security in attenuating levels of IU over time, potentially protecting youth against this generalized risk factor. As such, it is important for youth to recognize the importance of establishing and maintaining friendships with those with whom they share these characteristics. By promoting such friendships, researchers and practitioners would be educating youth to identify friends that can help them cope with or manage their symptoms of anxiety. In addition, early adolescents would benefit from being taught about the various ways in which anxiety can be manifested and about how the different components interact with one another, potentially exacerbating anxiety levels over time.

Finally, these findings also have important practical implications for enhancing the treatment of childhood anxiety and depressed affect. Given what we know about IU and its hierarchical position relative to worry, arousal and depressed affect, cognitive behavioural interventions for youth should target IU. Treatment programs should be aimed at teaching young adolescents various strategies to increase their tolerance to uncertainty, including gradual exposure tasks involving problem solving to challenge negative beliefs about uncertainty (Dugas & Ladouceur, 2000). Not only would these interventions help these youth cope with and manage their symptoms, but it would help increase their self confidence in their ability to deal with threat and uncertainty. Most importantly, it would be imperative to emphasize that these behavioural experiments should be conducted across all domains of life, given what we now know about contextual differences, and considering that uncertainty is ever-present.

Conclusion

Taken together, this study provides three important contributions to the study of anxiety in early adolescence. First, it offers a new tool that can be used to assess the individual components of anxiety in young adolescents across 2 critical contexts. Second, these findings provide support for IU as a higher order vulnerability factor for worry and arousal. Last, this study offers further evidence for the protective role of friendship security against the maintenance of anxiety over time. These findings lend further empirical support to the importance of friendships on reducing internalizing symptoms and on the need for targeted interventions aimed at the intolerance of uncertainty.

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Appendix A

Information Letter to Parents

October 17, 2016

Dear Parent(s),

I am a professor at Concordia University, where I teach and do research on the development of children and adolescents. One of the topics I study is how children's experiences with their parents, friends, and teachers affect their well-being. This topic is of interest to many parents, teachers, and health professionals. The purpose of this letter is to tell you about a study my students and I are conducting with fifth- and sixth-graders. This study will help us learn more about children, their health, and their development.

As part of the study, we will meet with the participating children in their classrooms two times during the school year, once in October or November and again in January. These meetings will last about 20 minutes. We will meet the children in their school and I will ask them to complete a questionnaire at their desks.

In these questionnaires, we will be asking children to identify:

- Who they typically associate with in school (for example who are their friends);
- The characteristics of other children in their class (that is, what are their peers like);
- Behaviours performed by other children in the class (e.g. helping, participating in certain types of activities, etc.);
- How they think about themselves;
- How they perform in school and in their social relationships.

All the questionnaires will be completed at the child's desk at school and none of the other children or the teachers will know how any other child has answered the questions.

In individual interviews the participating children will also play a set of games on a computer that will assess generosity toward others.

We will also ask the participating children's parent(s) to complete a questionnaire for us. It will ask questions about family functioning, parental education and employment, and family income. As an expression of our gratitude we will give two tickets to a local movie theater to parents who return the parent questionnaire to us. Parents who choose not to fill out the parent questionnaires can still allow their children to take part in the study.

Teachers will be asked to complete a short questionnaire about the academic and social functioning of the participating children.

As a token of thanks, all participating children will receive a gift of a t-shirt from the research team at the conclusion of the final data collection. In addition, we will be giving talks to

the students about mental health, and about ways to cope with the stressors they encounter in their daily lives.

We ask the children to keep their answers private and we make certain that their answers are kept confidential. The information collected in this study will be completely confidential, and participation is entirely voluntary. Your child is not required to participate in this study. Furthermore, you or your child may change your mind at any time even if you already gave your permission.

People who do research with children or adults are required to describe the risks and benefits related to participating in their studies. We assure you that this study poses no risks, other than what children encounter in their day-to-day lives. It is not a treatment study and it is not intended to provide direct benefits to the students who participate, though most children enjoy participating in such studies.

This study has been approved by both the School Board and the Concordia University Human Research Ethics Committee. If at any time you have questions or concerns regarding your rights or your child's rights as research participants, please feel free to contact the Research Ethics and Compliance Advisor of Concordia University, at ethics@alcor.concordia.ca.

If you have any other questions about the study, please call me at 514-848-2424 Ext. 2184 or send me a letter at: Department of Psychology, Concordia University, 7141 Sherbrooke Ouest, Montreal, QC, H4B 1R6. You can also email me at william.bukowski@concordia.ca.

Please fill out the attached form and have your child return it to his/her teacher tomorrow.

As an incentive for the children to return the assent form, any child who returns a slip, regardless of whether his/her parent has given permission for participation, will be given a set of Concordia University highlighters by the research team.

Thank you for your help. We very much appreciate it.

Sincerely,

William M. Bukowski
Professor

Appendix B

Parental Consent Form

ONE WORLD WHOLE CHILD PROJECT

Grades 5 and 6

PARENTAL CONSENT FORM

Please read and sign the following:

I understand that my daughter/son has been asked to be in a study conducted by Dr. W. M. Bukowski.

I understand that the study is about how children's experiences with their peers and how they think about themselves affects their well-being. I understand that if my daughter/son participates she/he will be asked to answer questionnaires at his/her desk in the classroom. I understand that the questionnaires are about how young people think and feel about themselves and their friends. I understand that the children will complete the questionnaires two times during the school year. I understand that all participating children will receive a gift of school supplies and a t-shirt from the research team at the conclusion of the final data collection.

I understand that my daughter/son does not have to be in the study. I understand that even if she/he participates at first but changes her/his mind she/he can quit at any time. I understand that all answers are confidential and will NOT be shown to anyone. Only Dr. Bukowski and the members of his research team will know what is in the questionnaires.

Please check one of the following and ask your daughter/son to bring this consent form the homeroom class tomorrow.

____ My son/daughter has permission to take part in Dr. Bukowski's study

____ My son/daughter DOES NOT have permission to take part in Dr. Bukowski's study.

Parent's Name: _____

Signature: _____ Date: _____

Child's Name: _____ Child's Gender □ Male □Female

Child's date of birth: DAY: _____ MONTH: _____ YEAR: _____

Appendix C
Questionnaire Instructions

WHAT ARE YOU LIKE?

Now we want to ask you some questions about what you are like. Everyone has different feelings about how they get along with others and how they do in school. In the next section we want you to mark down how much each sentence describes you. An example sentence is: “I felt accepted by other kids my age”.

For this question you can use the numbers from “1” up to “5” to show how you have felt in the past week.

1 = Never
2 = Almost never
3 = Sometimes
4 = Often
5 = Almost always

Remember to choose the number that best fits you. You can only choose one number for each question. After you chose a number, another sentence will appear. There are 8 sentences.

Please read each sentence carefully before answering, but don’t ponder about it too long.

Go ahead and get started.

Appendix D

Ethics Form

UNIVERSITÉ Concordia UNIVERSITY

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant: Dr. William Bukowski

Department: Faculty of Arts and Science\Psychology

Agency: N/A

Title of Project: One World / Whole Child - 2014

Certification Number: 30002779

Valid From: December 10, 2015 to: December 09, 2016

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Dr. James Pfaus, Chair, University Human Research Ethics Committee

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant: Dr. William Bukowski

Department: Faculty of Arts and Science\ Psychology

Agency: Social Sciences & Humanities Research Council

Title of Project: One World / Whole Child - 2014

Certification Number: 30002779

Valid From: May 04, 2017 to: May 03, 2018

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Dr. James Pfaus, Chair, University Human Research Ethics Committee