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Prospective Associations Between Adolescents' Peer Victimization and Physical Health Problems

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UNIVERSITY OF MIAMI

PROSPECTIVE ASSOCIATIONS BETWEEN ADOLESCENTS' PEER
VICTIMIZATION AND PHYSICAL HEALTH PROBLEMS

By

Whitney M. Herge

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

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Objective. This study evaluated an empirical model of peer victimization (PV) in adolescents via latent class analysis (LCA) and latent profile analysis (LPA). The study also evaluated the relationship between PV types (i.e., overt, relational, reputational, cyber) and physical health problems (including somatic and sleep problems). Adolescent anxiety was assessed as a possible mediator of the relationship between PV and physical health problems. **Method.** 1067 adolescents aged 13 to 19 years (M age = 15.80 years; 57% female; 80% Hispanic) were recruited from two high schools in Miami-Dade County and were assessed at 3 time points, each about 1½ months apart. At each time point, participants completed the *Revised Peer Experiences Questionnaire*, the *Cyber Peer Experiences Questionnaire*, the *Revised Children's Manifest Anxiety Scale*, the Somatic Symptoms Subscale from the *Youth Self Report*, and three items specifically assessing sleep difficulties. **Results.** Three primary aims were evaluated. *Aim 1* attempted to replicate an empirical model of PV by Wang and colleagues (2010) and to examine whether an LPA approach would yield greater differentiation in PV patterns. LCA analyses revealed a partial replication of Wang et al.'s (2010) model, including a three-class structure, characterized in part by a low PV class and an interpersonal PV class. However, in contrast, Wang et al. (2010) identified a third class characterized by elevated PV experiences across the board (i.e., overt, relational, reputational, cyber, and verbal), whereas the third class identified in the current study was characterized by

elevations in overt and reputational PV only. Subsequent LPA analyses did not provide further PV class gradation, and a one-class structure was determined to best fit the data. *Aim 2* evaluated the direct relationships between overt, relational, reputational, and cyber PV and adolescents' somatic complaints, sleep deficits, and excess sleep symptoms. Results suggested that relational, reputational, and cyber PV were associated with somatic symptoms; reputational and cyber PV (trending) was associated with excessive sleep; and cyber PV predicted sleep deficits. *Aim 3* examined general anxiety symptoms as a potential mediator of the relationships between PV types and physical health symptoms; general anxiety acted as a mediator-like variable of the relationship between relational PV and each physical health outcome, but did not serve as a mediator-like variable for the other PV types. **Discussion.** The findings suggest that PV may have significant, detrimental effects on adolescents' physical health, including somatic and sleep symptoms. Interpersonal forms of PV, including relational, reputational, and cyber PV, may be particularly harmful in this regard. Further, relational PV may negatively impact adolescents' somatic and sleep symptoms via symptoms of general anxiety; additional research is required to assess potential mediators of cyber and reputational PV, such as depressive symptoms. The findings have implications for intervention and prevention, including: the importance of assessing PV experiences in youth with unexplained physical health problems; targeting mental and physical health sequelae of PV experiences; and educating adolescents on safe, appropriate, and effective in-person and online interpersonal skills in order to prevent or minimize PV experiences.

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CHAPTER 1: BACKGROUND

Peer victimization (PV), or the intentional infliction of physical or psychological harm on another (De Los Reyes & Prinstein, 2004; Rigby, 2003), has been shown to negatively affect adolescents' mental and physical health (e.g., La Greca & Harrison, 2005; Reijntjes, Kamphuis, Prinzie, & Telch, 2010; Rigby 2001, 2003). PV is a frequent problem affecting both children and adolescents (Dinkes, Cataldi & Lin-Kelly, 2007). Evidence indicates that approximately 25% of public schools consider PV a daily or weekly problem (Dinkes et al., 2007). Further estimates suggest that approximately 50% of youth (ages 13-16 years) experience victimization at least once during an academic year (Rigby, 1998).

Adolescent PV experiences are a particularly important topic of research as PV has been associated with a host of negative mental and physical outcomes. PV has been associated with internalizing symptoms, particularly social anxiety and depression (e.g., La Greca & Harrison, 2005; Reijntjes et al., 2010; Siegel, La Greca, & Harrison, 2009). It has also been linked with physical symptoms, such as headaches, stomachaches and general pain (see Rigby, 2001 and Rigby, 2003 for a review).

Although the relationship between PV and internalizing symptoms has been documented, research on the association between PV and physical health problems is less well-developed, and work with adolescents is particularly scant. Existing research on the physical health effects of PV has predominantly assessed pre-adolescent youth. Further, the majority of studies have been cross-sectional in design (Rigby, 2001, 2003), and thus little is known about the potential causal interplay between PV and physical health problems among adolescents. Moreover, existing studies have neglected to examine

possible mechanisms accounting for the relationship between PV experiences and physical health problems, and as such, the processes underlying this relationship are poorly understood. Finally, the role that moderating variables may play has also received insufficient attention in the literature.

To address the limitations of the existing literature on PV and physical health problems in adolescents, the current study had three primary aims. The *first aim* was to test an empirical model of PV that was initially developed in youth grades six through ten (Wang, Iannotti, Luk & Nansel, 2010). The current study evaluated whether similar PV *profiles* would be apparent in high school students, 13-19 years of age. To do this, a latent class analysis (LCA) was conducted in an attempt to replicate Wang et al.'s (2010) findings with older adolescents. Grade, gender, and ethnicity were included as covariates in the model, to assess possible victimization differences experienced by adolescents of different ages, boys and girls, as well as Caucasian and non-Caucasian adolescents. Further, a series of latent profile analyses (LPAs) were also conducted, with gender, grade, and ethnicity again included as covariates, to determine if the three class structure identified by Wang et al. (2010) is supported when PV is assessed by a greater variety of PV items and scored with continuous, rather than categorical, variables.

The *second aim* of the study was to examine the prospective relationship between PV experiences and adolescents' physical health problems, specifically their somatic complaints and sleep problems (treated in the current study as separate outcomes). Four PV types that have been previously identified in the literature, including overt, relational, reputational, and cyber PV, were used to predict adolescents' somatic complaints and sleep problems, to determine if PV experiences predict health problems prospectively.

The *third and final study aim* was to examine adolescent general anxiety symptoms as a potential mediating variable underlying the prospective relationship between PV and physical health problems. To contextualize each of these aims, the definition and prevalence of PV in adolescents will be described below, as well as the existing literature relevant to each of the key study aims.

Peer Victimization: Definition and Prevalence

Attention to PV and its potential deleterious effect on youths' physical functioning is critical for both research and practice. PV is generally described as being the recipient of a peer's aggressive attempts to harm the individual (e.g., Crick, 1996; Crick & Bigbee, 1998; De Los Reyes & Prinstein, 2004; Rigby, 2003). This concept of harm is an intentionally broad one, as PV encompasses a myriad of physical, psychological, and social acts, as described below (De Los Reyes & Prinstein, 2004).

Recognition of PV types has evolved in recent years. Current formulations identify several types of PV, including overt, relational, and reputational. *Overt* PV is characterized by a peer's threats or attempts to harm a youth's physical well-being through kicking, punching, hitting, or verbal threats. *Relational* PV refers to acts such as intentionally excluding a peer from a conversation or activity (i.e., social exclusion), and *reputational* PV refers to acts such as intentionally damaging a peer's social reputation via rumor spreading or public embarrassment (De Los Reyes & Prinstein, 2004). Follow-up work has confirmed the existence of these distinctive PV types in youth (e.g., Siegel et al., 2009).

In addition to overt, relational, and reputational PV, recent interest has emerged in a potential new PV type: *cyber* victimization (Landoll & La Greca, 2010). Cyber

victimization includes acts of peer aggression that occur via electronic media, such as text messages, picture and video messages, email, and social networking sites (SNS; Landoll & La Greca, 2010; Landoll, La Greca, & Lai, In Press). Examples of cyber victimization include having a peer post illicit or embarrassing photos or having a peer post a mean comment on one's SNS page (Landoll & La Greca, 2010; Landoll, La Greca, & Lai, In press). Research regarding cyber victimization's impact on adolescents is in its very early stages, however, and requires additional investigation.

New Perspective on Peer Victimization

In contrast to the literature presented thus far, researchers have begun to measure adolescent PV in an alternative, more precise way that may better capture youths' PV experiences. Specifically, instead of assessing PV from a broad variable-centered approach, Wang and colleagues (2010) classified PV experiences into *profiles*, based on questions designed to address each recognized PV type. These authors used latent class analysis (LCA) to identify an empirical model of PV, consisting of three PV profiles, in 7,475 youth in grades six through ten (from the 2005/2006 Health Behavior in School-Aged Children Study). The first profile was characterized by high levels of all five types of PV: physical [or overt], verbal [or overt/reputational], cyber, social exclusion [or relational], and rumor spreading [or reputational]; approximately 10% of males and 6% of females fit this pattern. The second profile was characterized by high levels of verbal victimization, social exclusion and rumor spreading; approximately 28% of males and 35% of females fit this pattern. Finally, the third profile was characterized by low levels of each of the five PV types, which accounted for 62% of the males and 59% of the females in the sample.

Based on these PV profiles, a relationship was found between class membership and a range of mental and physical health problems. As the degree of victimization increased, moving from class three (low levels of all PV types) to class one (high levels of all PV types), levels of depressive symptoms, frequency of injury, and frequency of medicine use also increased.

Despite its innovation in terms of PV assessment and classification, the work by Wang and colleagues (2010) has a number of limitations. Specifically, the quantity and quality of the items used to assess PV and possible PV patterns was limited. The items were few in quantity (eight items total to assess five types of PV) and did not always assess a single, unique PV type. For example, items tapping “verbal” PV included “being called mean names and comments about race or color” and “being called mean names and comments about religion;” these items could also represent overt or reputational PV. In addition, the PV items were coded in a categorical manner (i.e., never experienced PV vs. any PV experience), which may have resulted in an overestimation of youths’ PV experiences and thus inflated class membership. Further, the assessment of the relationship between PV and mental/physical health outcomes was concurrent. As such, it cannot be concluded that youths’ PV experiences contributed to their mental and physical health outcomes.

To address these limitations, the current study evaluated the empirical model of PV obtained by Wang and colleagues (2010), and also expanded its methodology (Study Aim 1). As described in detail below, the current study replicated the series of LCAs conducted by Wang and colleagues (2010) in an older adolescent sample. It was hypothesized that a similar three-profile model would emerge, including one group

identified by low levels of all PV types, one group identified primarily by interpersonal PV experiences, and a polyvictimized group. Further, a series of latent profile analyses (LPAs) were also conducted using all available PV items scored continuously to determine if further differentiation of PV profiles would emerge. It was hypothesized that at least three profiles (similar to the LCA results) would be found.

Demographics: The Role of Gender and Ethnicity in Understanding Youths' PV Profiles

To understand how PV experiences may affect adolescents, it is also important to consider issues of gender and ethnicity. Specifically, gender has been differentially associated with the experience of PV types, such that boys generally report higher levels of overt PV than girls (Bjorkqvist, 1994; Owens, Shute, & Slee, 2000; Peskin, Tortolero, & Markham, 2006; Prinstein, Boergers, & Vernberg, 2001). Girls more often report interpersonal (i.e., relational and reputational) forms of PV than boys (La Greca & Harrison, 2005; Peskin et al., 2006; Siegel et al., 2009), although gender differences have not always been found for interpersonal PV (e.g., Prinstein et al., 2001).

With respect to Study Aim 1, an examination of PV profiles, these gender-based differences were also apparent in the PV profiles identified by Wang and colleagues (2010). Specifically, boys had a higher likelihood of being in class one, reflecting high levels of all victimization types (9.7% of males vs. 6.2% of females). In the current study, gender differences were expected to emerge in the PV profile analyses (i.e., LCA and LPA analyses); it was hypothesized that a polyvictimized group would emerge, and further that this group would be composed of a higher proportion of boys than girls. It was also hypothesized that an interpersonal PV group would emerge, representing high levels of relational and reputational PV, and that girls would be more prevalent in this

group than boys. A third group, identified by low levels of all PV types, was expected to emerge; it was not anticipated that gender differences would exist in this group.

Ethnic differences were also considered to be potentially important in understanding adolescent PV profiles and were examined in a preliminary fashion in the current study. Existing research regarding ethnic differences in adolescent PV has produced mixed results. Some studies found the prevalence of victimization to be lower among Hispanic youth compared to White and Black adolescents (i.e., Juvonen, Graham, & Schuster, 2003), whereas others have found the prevalence of PV to be lower among Black youth compared to White and Hispanic adolescents (i.e., Nansel, Overpeck, Pilla, Ruan, Simons-Morton, & Scheidt, 2001). With respect to PV profiles, Wang and colleagues (2010) had limited results regarding ethnicity, although Hispanic adolescents displayed a lower likelihood of being in class two (interpersonal PV) than class three (low victimization). Because the current study evaluated a predominantly Hispanic sample, it was not expected that ethnicity would play a significant role in youths' PV classification in the LCA or LPA analyses. However, potential ethnic differences (i.e., Hispanic vs. non-Hispanic) were evaluated in a preliminary and exploratory manner.

Across measurement perspectives (variable centered vs. person centered approaches), PV has become an increasingly important and relevant research topic due to its reported prevalence among youth as well as its association with negative mental and physical health outcomes (Dinkes et al., 2007). For example in 2005-2006, 24% of public schools reported that victimization was either a daily or weekly problem within their institution (Dinkes et al., 2007). Similarly during that year, 28% of students between 12 and 18 years of age reported having been victimized in some way in the past

six months (Dinkes et al., 2007). PV clearly represents a common experience for adolescents and as such, its effects on adolescent mental and physical functioning merit examination.

Peer Victimization and Health

Although not the focus of the current study, it should be noted that substantial research has documented the negative impact of PV on adolescents' mental health. Briefly, PV experiences have been associated with negative mental health outcomes, including symptoms of depression and anxiety, particularly social anxiety (La Greca & Harrison, 2005; Siegel et al., 2009; Wang et al., 2010). Further, PV has been associated with internalizing symptoms in a bidirectional manner, such that PV predicts internalizing symptoms in youth, and internalizing symptoms predict subsequent PV, indicating that a cyclical process may exist (Reijntjes et al., 2010). This bidirectional relationship may help explain the typically high stability observed amongst PV experiences in adolescents (Reijntjes et al., 2010).

Despite the comprehensive findings linking PV to internalizing symptoms in adolescents, relatively little work has examined the associations between PV and physical health problems (including somatic complaints and sleeping problems)¹ in youth, and research is particularly sparse with adolescent populations (see Rigby, 2001, 2003). The majority of studies have been conducted with pre-adolescent and middle-school children, and studies of high school age youth are lacking. This is particularly concerning given the reported prevalence of PV experiences among high school aged adolescents as well as the significance that negative peer interactions may have during this developmental

¹ Note: In the existing literature, research examining PV and physical health has included both somatic complaints and sleep problems as outcome variables. As such, *physical health problems* will be used in the current manuscript to refer to both sets of problems.

period (Azmitia, 2002; Dinkes et al., 2007; Larson & Richards, 1991; Newcomb & Bagwell, 1995).

Across development, PV appears to be associated with physical health problems. For example, among elementary school children (ages 6-9 years), children who reported overt PV also reported significantly more physical health problems than their non-victimized peers (Wolke, Woods, Bloomfield, & Karstadt, 2001). Children's health complaints included sore throats, colds, coughs, breathing problems, nausea, and poor appetite. Additional research with children 7 to 10 years found an association between general PV experiences and increased risk for stomachaches, bed wetting, headaches, and sleeping problems (Williams, Chambers, Logan & Robinson, 1996). The findings suggest a dose-response effect, such that the more frequently a child reported being victimized, the higher the number of physical health problems. Although it is assumed that PV contributed to youth's physical health problems, these studies were cross-sectional, and are thus inconclusive.

Similar concurrent associations between PV experiences and physical health complaints have been found in a very limited number of studies with older children and adolescents. Among youth aged 9-12 years, PV has been associated with neurovegetative disorders (including heart palpitations and breathing problems), digestive problems, and pain and skin problems (Houbre, Tarquinio, Thuillier & Hergott, 2006). Among slightly older youth (adolescents aged 13-16 years), higher levels of general PV were significantly associated with poorer general health (Natvig, Albrektsen & Qvarnstrom, 2001; Rigby, 1998). Evidence again suggests a dose-response relationship, such that higher levels of physical health problems are reported by youth who are more frequently

victimized; however, the cross-sectional nature of the study tempers the conclusions that can be drawn.

Prospective studies are beginning to show that PV experiences predict adolescents' physical health problems over time. For example, Rigby (1999) found that PV experiences assessed in grades eight and nine significantly predicted adolescents' physical health problems in grades eleven and twelve. Even after controlling for health status in grades eight and nine as well as PV experiences in grades eleven and twelve, greater frequency of PV experiences when younger were shown to predict poorer physical health in adolescents over time. Likewise, Biebl and colleagues (2011) found that youth who reported chronic PV experiences across three assessment points (ages 5 years; 10-18 years; 12-20 years) were more likely to experience physical health problems, compared to those who reported decreasing levels of PV or who were non-victims. In particular, chronic PV was associated with higher levels of sleep problems and headaches. This study was limited, however, by its inconsistent assessment of PV (coding of free play behaviors at 5 years; questionnaires at 10-18 years; phone interviews at 12-20 years), making the interpretation of these results difficult.

Finally, researchers have also begun to explore possible bidirectional relationships between PV and physical health problems in youth, albeit only in children. For example, in a sample of children aged 9-11 years who were assessed over the course of six months, general PV experiences were shown to predict the development of physical health problems over the study period, compared with youth who were not victimized (Fekkes, Pijpers, Fredriks, Vogels & Verloove-Vanhorick, 2006). However, these authors did not find that physical health problems predicted PV experiences over time, suggesting that

health complaints were a consequence of PV but not a factor contributing to PV.

Additional research is necessary to replicate this finding in adolescents.

In summary, research examining the association between PV experiences and physical health problems in youth is still in its preliminary stages. Existing studies mainly have examined these concepts in pre-adolescents, and thus there is limited understanding of these constructs in adolescents. Further, the majority of research is cross-sectional and thus precludes an investigation of the directional pathways between PV and physical health problems in adolescents or of the underlying mechanisms driving this association. The current study addressed each of these limitations by examining adolescents' PV experiences and their physical health problems, specifically somatic complaints and sleep problems, prospectively across three time points (Study Aim 2). This study also investigated a potential mediational pathway in the above relationship, namely adolescent anxiety, as explained below (Study Aim 3).

Mediation: The Role of Anxiety

For Study Aim 3, the potential role of anxiety as a mediator of the relationship between adolescent PV and physical health problems was evaluated. Scant research has examined the potential mechanisms that may explain the relationship between PV and physical health problems. In fact, only one study evaluated a possible explanatory mechanism linking PV to physical health problems in youth. Specifically, Biebl and colleagues (2011) examined the role of "emotional symptoms," which included items assessing general and social anxiety, finding that youth (12 to 20 years) who reported both chronic levels of PV and greater emotional problems also reported significantly more concurrent physical complaints compared to youth who reported either chronic

levels of PV *or* elevated emotional symptoms only. Such findings indicate that the presence of emotional symptoms, including anxiety, within the context of ongoing PV, may be implicated in the development of physical health symptoms; however due to the concurrent assessment of emotional and physical symptoms in Biebl and colleagues' (2011) study, the temporal relationship of these constructs cannot be identified.

Biebl and colleagues' (2011) hypothesis is consistent with studies that have independently identified associations between PV experiences and anxiety symptoms (i.e., Reijntjes et al., 2010; Siegel et al., 2009), as well as studies identifying associations between anxiety symptoms and physical health complaints (i.e., Alfano, Ginsburg, & Kingery, 2007; Bardone, Moffitt, Caspi, Dickson, Stanton, & Silva, 1998; Sareen, Jacobi, Cox, Belik, Clara, & Stein, 2006). As noted above, research has shown that PV experiences prospectively predict symptoms of anxiety, especially social anxiety, such that youth who report elevated levels of PV also report higher levels of social anxiety over time (i.e., Reijntjes et al., 2010; Siegel et al., 2009). Further, research has begun to identify an association between adolescent anxiety symptoms and physical health problems over time (Bardone et al., 1998). Specifically, adolescent anxiety has been prospectively linked to increased levels of young adult medical problems (i.e., Bardone et al., 1998) and concurrently linked to sleep problems, including insomnia, nightmares, and reluctance to sleep alone (Alfano et al., 2007).

The present study evaluated whether symptoms of general anxiety mediate the relationship between PV experiences and adolescents' physical health problems (Study Aim 3). While social anxiety was also considered as a possible mediator due to its strong associations with PV, general anxiety was ultimately selected as a mediator as it has been

found to be associated with both somatic symptoms (Bardone et al., 1998) *as well as* sleep difficulties in youth (Alfano et al., 2007) and was expected to have stronger predictive value for the current study's outcome variables. Thus, it was hypothesized that general anxiety would partially mediate the relationship between PV and physical health problems, such that youth who report experiencing higher levels of PV would also report higher levels of general anxiety, which in turn would lead to greater physical health problems. However, direct paths between PV types and physical health problems were also predicted to exist, given the complex nature of PV and its impact on adolescent functioning.

Current Study

There are multiple gaps in the literature examining the association between PV and physical health problems among youth. First, research with adolescent and high school aged youth is sparse, despite the documented prevalence of PV within this age group. Second, the majority of studies examining PV and physical health problems have been conducted within a cross-sectional framework, and thus are unable to provide information related to potential causal pathways. Third, there has been scant attention to possible mechanisms that could account for the relationship between PV experiences and physical health problems. Finally, it is not understood whether PV profile membership is impacted by gender and ethnic variation. The current study addressed each of these gaps in research via three primary aims.

Aim 1: The first aim was to evaluate an empirical model of PV profiles, based on Wang and colleagues' (2010) findings, with the goal of improving the assessment of PV. This was accomplished through several steps. First, we attempted to replicate Wang et

al.'s (2010) findings by conducting a latent class analysis (LCA) of PV experiences, including gender, ethnicity, and grade² as covariates. Specifically, by using items to assess PV that are very similar to those used by Wang et al. (2010), we evaluated whether the three class outcome of PV types generalized to an older adolescent sample (grades 9 through 12).

Second, we attempted to extend our understanding of PV types by using an alternative method to examine PV profiles. This alternative method provided a continuous, more comprehensive assessment of PV. Specifically, using *all* available PV items, a latent profile analysis (LPA) of PV experiences was conducted on a random subset of the main sample, with gender, grade, and ethnicity included as covariates. The number of profiles was initially restricted to three, as obtained by Wang et al. (2010), however overall model fit was compared with outcomes that included additional and fewer classes. Once the optimal number of PV classes was identified, the results were cross-validated in the remainder of the sample.

Hypothesis 1.1: It was hypothesized that a three-class pattern of PV would emerge from the LCA, similar to findings of Wang et al. (2010). It was expected that the majority of adolescents would report low levels of each PV type; a smaller percentage would report experiencing elevated levels of interpersonal PV (i.e., reputational and relational PV); and an even smaller percentage would report elevated levels of each PV type.

Hypothesis 1.2: It was hypothesized that in the LPA analyses, three or more PV profiles would emerge when a comprehensive list of continuously scored items was used

² Grade will be included as a covariate in this step in order to replicate Wang et al.'s (2010) analytic procedure. Potential grade differences will be examined in a preliminary manner.

to assess PV. Because LPA analyses employ continuous data rather than categorical data, additional differentiation in PV was expected to emerge from the data, reflected in a higher number of PV profiles.

Hypothesis 1.3: It was expected that the LPA results would be confirmed using split half reliability sampling.

Hypothesis 1.4: Across analyses, it was hypothesized that the (expected) polyvictimized group would have a higher proportion of boys than girls, and the (expected) interpersonal PV group would have a higher proportion of girls than boys. Considering ethnicity, it was not anticipated that Hispanic-ethnicity status would significantly impact PV classification.

Aim 2: The second aim was to examine possible prospective associations between PV experiences and physical health problems. A variable centered approach was adopted; latent variables representing the four PV types, including overt, relational, reputational, and cyber PV were created and assessed as predictors of prospective youth physical health problems. Physical health problems included adolescent somatic complaints and sleep problems (i.e., sleep deficits and excess sleep).

Hypothesis 2: It was hypothesized that each PV type would significantly and uniquely predict adolescent's somatic and sleep complaints. Given the limited research examining the relationships between specific PV types and physical health problems, no predictions were made regarding the relative strength of each PV predictor.

Aim 3: The third aim was to assess general anxiety as a possible mediating variable in the relationship between PV and physical health problems.

Hypothesis 3: It was hypothesized that general anxiety would function as a partial mediator of the relationship between youth PV experiences and their physical health problems. This would indicate that higher levels of PV experiences are predictive of greater general anxiety, which in turn is predictive of greater physical health problems in adolescents. However, only partial mediation was hypothesized, as it was also expected that significant direct paths between PV experiences and physical health problems would also exist.

CHAPTER 2: METHOD

Participants

Participants were adolescents who completed questionnaires at least once during the study's three time points. The study sample consisted of 1067 adolescents, 13 to 19 years of age ($M = 15.80$; $SD = 1.20$; 57% female). Adolescents were recruited from two high schools in the Miami-Dade County Public Schools (M-DCPS). Of the total sample, 35% were in Ninth grade, 30% were in Tenth grade, 22% were in Eleventh grade, and 13% were in Twelfth grade. The sample was racially and ethnically diverse (*Race*: 84% = White, 12% = Black, 4% = Asian; *Ethnicity*: 80% Hispanic), reflecting the composition of the community.

Procedure

This project was part of a larger multi-wave study of adolescents' peer relations (La Greca, 2010) that assessed adolescents at three time points (see Figure 1). Each time point was approximately six weeks apart. Adolescents represented 45% of those available for participation (based on total parental consents distributed; see Figure 1).

Following Institutional Review Board and M-DCPS approval, school principals were contacted to recruit their participation in this study. After obtaining principal and teacher permission to recruit students, parent letters and consent forms were distributed by teachers to students. Teachers encouraged students to return and to collect consent forms; \$20 gift certificates were provided to all participating principals and teachers. Students who participated at each time point were entered in a raffle to win a \$50 gift certificate (first prize), or one of two \$20 gift certificates (second prize). A separate raffle was conducted for each school. For Time 1 data collection (February 2011),

adolescents signed an assent form, or consent form if they were 18 years of age or older, and completed the Time 1 packet of questionnaires. These were completed during class time and supervised by trained research assistants and doctoral graduate students.

Students then completed follow-up questionnaires in late March/early April (Time 2) and late April/early May (Time 3). These follow-up assessments were completed in an identical manner.

Measures

Adolescents completed the same measures at all three time points. The measures for this study included demographic, psychosocial, behavioral, and somatic/sleep variables, described below. Parental consent forms were provided in both English and Spanish; however, study questionnaires were in English only, as students in M-DCPS high schools generally demonstrate sufficient English proficiency, as seen in previous research (e.g., La Greca & Harrison, 2005; Siegel et al., 2009). Completion of the baseline and follow-up school assessments took between 30-45 minutes per assessment.

Demographic Variables (See Appendix A). These include age, gender, grade, ethnicity, native language and family structure. Gender was coded such that 0 = Male, 1 = Female. Ethnicity was coded in two ways for the LCA and LPA analyses: in the LCA, non-Caucasian = 0, Caucasian = 1, in order to replicate the procedures of Wang et al. (2010); in the LPA, non-Hispanic = 0, Hispanic = 1, reflecting the most appropriate referent group for the current sample. Ethnicity was again coded as non-Hispanic = 0, Hispanic = 1 for the structural equation models in Aims 2 and 3. Demographic information was obtained by means of a questionnaire designed by study authors for this

research project, and was collected in order to assess important control variables that may affect the interpretation of study findings.

Peer Victimization (See Appendix B). The *Revised Peer Experiences Questionnaire* (R-PEQ; De Los Reyes & Prinstein, 2004) is an 18-item scale that assesses relational, reputational, and overt victimization that has occurred over the past two months. Each of the three subscales is comprised of three items. Sample items include “Some peers left me out of an activity that I really wanted to be included in” (relational victimization), “A teen gossiped about me so others would not like me” (reputational victimization) and “A peer hit, kicked, or pushed me in a mean way” (overt victimization). Participants rated how often each event occurred to them in the past two months using a 5-point scale (1 = *Never* to 5 = *A Few Times a Week*). Averages are calculated for each subscale such that possible scores ranged from 1 – 5, with higher scores reflecting greater victimization. The R-PEQ has excellent reliability and validity with adolescents, and has been moderately correlated with other measures indicative of social-psychological problems, including depressive symptoms, social anxiety, and low perceived social acceptance (e.g., De Los Reyes & Prinstein, 2004; La Greca & Harrison, 2005; Siegel et al., 2009). Internal consistency for each subscale has been adequate: overt PV .59 - .78, relational PV .75 - .84, reputational PV .80 - .87 (De Los Reyes & Prinstein, 2004; Siegel et al., 2009). Similar results were found in the current study (Time 1: overt PV $\alpha = .66$, relational PV $\alpha = .74$, reputational PV $\alpha = .79$; Time 2: overt PV $\alpha = .74$, relational PV $\alpha = .70$, reputational PV $\alpha = .78$; Time 3: overt PV $\alpha = .75$, relational PV $\alpha = .76$, reputational PV $\alpha = .78$).

Cyber - Peer Experiences Questionnaire (C-PEQ; Landoll & La Greca, 2010; Landoll, La Greca, Herge, Chan, & Lai, 2012; Landoll, La Greca, Lai, Herge, & Chan, In preparation; See Appendix C). The *Cyber - Peer Experiences Questionnaire (C-PEQ)* assesses aversive peer experiences that have occurred via electronic media in the past month. This measure is based on an earlier version that assessed peer victimization experiences via social networking sites, the *Social Networking-Peer Experiences Questionnaire* (Landoll et al., In press). This version of the measure contains nine items that measured aversive peer experiences as they occur across a wide variety of electronic media (Landoll et al., In preparation). Electronic media encompasses social networking sites (e.g., Facebook, Instagram), web sites (e.g., Formspring, YouTube), texting, and instant messaging. Sample items include “A peer posted mean things about me publicly via electronic media,” and “A peer posted pictures of me that made me look bad via electronic media.” Adolescents rate how often each event occurred to them over the past two months using a 5-point scale (1 = *Never* to 5 = *A Few Times a Week*). Possible item scores range from 1 – 5, with higher scores reflecting greater victimization. To obtain a mean C-PEQ score, the nine negative items are averaged. Research has demonstrated that cyber victimization is a unique and separate construct from traditional forms of PV (Landoll et al., In preparation). Further, the stability of this measure has been supported in adolescents, as indicated by measurement invariance demonstrated over a six-week period (Landoll et al., In preparation). In the current sample, internal consistency of the nine negative items was high (Time 1 $\alpha = .78$; Time 2 $\alpha = .81$; Time 3 $\alpha = .85$).

Anxiety Symptoms (See Appendix D). Symptoms of fear and anxiety present in the past two months were assessed with the ten item short form of the *Revised Children's Manifest Anxiety Scale: Second Edition* (RCMAS-2 SF-TOT; Reynolds & Richmond, 2008). This widely used measure includes items such as "I am nervous," and "I worry that others do not like me." Youth respond either *Yes* (coded 1) or *No* (coded 0) to each item; scores are summed across the ten items. This scale was normed on youth between the ages of 6 and 19 years, and has been reliable and valid across several ethnic groups (Reynolds & Richmond, 2008). This scale has also demonstrated good internal consistency ($\alpha = .92$ for the full measure) and one-week test-retest reliability (.76 for the full measure; Reynolds & Richmond, 2008). In the current sample, internal consistency at Time 1 was .74, at Time 2 was .79, and at Time 3 was .82.

Physical Health Problems (See Appendix E). Physical health problems included somatic and sleep symptoms. Specifically, the *Youth Self-Report* (YSR; Achenbach & Rescorla, 2001), a widely-used measure, assesses a range of child and adolescent symptoms, including affective, anxiety, somatic and attention problems. The Somatic Symptom Subscale (nine items) was used in this study to assess adolescent somatic symptoms present in the past month. Items include "I feel dizzy," and I have "physical problems without a known medical cause," such as "headaches," "nausea," and "rashes or other skin problems."

Additionally, three items were added to this questionnaire to examine adolescents' sleep problems. Sleep symptoms have been consistently included under the broader umbrella of physical health symptoms (e.g., Biebl et al., 2011; Wang et al., 2010), and were treated in a similar manner in the current study. Two *sleep deficit* items

were included: I “have a hard time falling asleep,” “have trouble staying asleep”; one *excess sleep* item was included: I “sleep more than usual.” Sleep deficit items were kept separate from the excess sleep item, as it was believed that an aggregate latent variable would not fit the data well. These sleep items have been used in past research with youth (Herge, La Greca, Flitter, Auslander, Thomas, Short, 2011; La Greca, Herge, Lai, Chan, in preparation).

For all somatic and sleep items, participants endorsed items on a three point scale (0 = *Not True*, 2 = *Very True or Often True*). Somatic scores are averaged across items, with higher scores reflecting greater somatic health problems; the same is true of sleep deficit items. The YSR has good reliability and validity (Achenbach & Rescorla, 2001). Internal consistency has been high (.80) and test-retest reliability, adequate (.76; Achenbach & Rescorla, 2001). Internal consistency of the nine somatic complaints in the current sample at Time 1 was .76, at Time 2 was .80, and Time 3 was .84. Internal consistency of the two sleep deficit complaints at Time 1 was .68, at Time 2 was .74, and at Time 3 was .73. Internal consistency of excess sleep concerns could not be computed as there was only one item assessed at each time point.

Data Analytic Plan

For the first study aim, to test an empirical model of PV, the following procedures were used. For the latent class analyses (LCA), select Time 1 R-PEQ and C-PEQ items were used that most closely matched those used by Wang et al. (2010); these items were then scored dichotomously with 0 = *never experienced* and 1 = *ever experienced* (see Table 1). These dichotomous items, as well as gender, grade, and ethnicity (Caucasian vs. non-Caucasian) were used as indicators in the LCA. Model fit was assessed based on

the Bayesian Information Criterion (BIC), the Lo-Mendell-Rubin Test, the Bootstrapped Likelihood Ratio Test, and entropy values (Kline, 2011).

For the latent profile analyses (LPA), the full sample was randomly split into two subsamples, A and B. For subsample A, all the available PV and cyber PV items were included as indicators of the latent PV construct. This included all available Time 1 overt (three items), relational (three items), and reputational (three items) R-PEQ items, and all cyber PV items (nine items). Demographic variables, including gender, grade, and ethnicity (Hispanic vs. non-Hispanic), were also included as indicators of the LPA in subsample A. This procedure was then replicated in subsample B. Model fit was again assessed based on the Bayesian Information Criterion (BIC), the Lo-Mendell-Rubin Test, and entropy values (Kline, 2011).

For Aims 2 and 3, which assessed the relationship between PV and physical health problems, as well as the mediating role of general anxiety, latent variables reflecting each of the PV types were created. Specifically, the three overt PV items were summed at Time 1, Time 2, and Time 3 and these three summary scores were used to create an overt PV latent variable. The same process was used to create relational, reputational, and cyber PV latent variables.

Similarly, for Aims 2 and 3, three latent variables were created reflecting somatic complaints, sleep deficit, and excess sleep complaints. The nine somatic YSR items were summed at Time 1, Time 2, and Time 3 and these three summary scores were used to create a latent variable for somatic complaints. The same process was used to create sleep deficit and excess sleep complaint latent variables.

For Aim 3, a latent variable reflecting general anxiety was created. Specifically, the ten RCMAS-2 items were summed at Time 1, Time 2, and Time 3 and these three summary scores were used to create a latent variable for general anxiety.

To test the path models examined in Aims 2 and 3, Structural Equation Modeling in Mplus 6.11 (Muthen & Muthen, 2011) was used. The full information maximum likelihood procedure was used to include participants who had individual data points missing, presumed to be missing at random. This procedure, which is the default in Mplus 6.11, estimates missing data values based on the current estimate of known parameters and then re-estimates the parameters based on known and imputed data (Collins, Schafer, & Kam, 2001). This is a preferred method for handling missing data, as it includes all available data in statistical analyses (Collins et al., 2001).

Overall model fit in Aims 2 and 3 was assessed with a chi-square analysis, root-mean-square error of approximations (RMSEA; values below .06 indicate good fit; Kline, 2011), comparative fit index (CFI; values above .90 indicate acceptable fit; Hu & Bentler, 1998; Hu & Bentler, 1999), and the standardized root mean square residual (SRMR; values less than .08 are acceptable; Kline, 2011). However, due to the large sample size of the current study, the chi-square value is not considered the best indicator of model fit (Kline, 2011), and instead, the CFI, RMSEA and SRMR values are considered better indicators. As such, these latter three indicators will be the focus of subsequent analyses.

CHAPTER 3: RESULTS

Preliminary Analysis

Data were examined for missingness, outliers, normality, and linear relationships between variables. One item, C-PEQ #9, exhibited unacceptable levels of skewness (3.43) and kurtosis (9.75) due to an extremely low endorsement rate; this item, which was to be used in the LCA series only, was dropped from analyses, and the results reported below do not include this item. Scales were also assessed for sufficient internal consistency and found to be adequate.

Missingness. At Time 1, 1067 adolescents participated (9% of eligible sample missing); at Time 2, 1047 adolescents participated (11% of eligible sample missing); and at Time 3, 1000 participated (15% of eligible sample missing; see Figure 1). In regards to individual item-level missing data, full information maximum likelihood (FIML) estimation procedures were used to account for missing data (Muthen & Muthen, 2010). This procedure utilizes all available data and has been shown to provide accurate parameter estimates (Kline, 2011; Peters & Enders, 2002). No differences were found between adolescents that participated at all three time points and adolescents that participated at either one or two time points for all major demographic and Time 1 study variables, including: age, grade, sex, Hispanic status, overt PV, relational PV, reputational PV, cyber PV, general anxiety symptoms, somatic symptoms, sleep deficit symptoms, and excess sleep symptoms.

Descriptive Information. Means and standard deviations were computed for each study variable (see Table 2). On average, adolescents endorsed experiencing similar levels of PV as found in previous community-based studies (i.e., La Greca & Harrison,

2005; Siegel et al., 2009); generally, adolescents reported experiencing between zero and two incidences per PV type in the past two months. Ethnic differences were found for each PV type at Time 1, however, such that Hispanic adolescents reported experiencing significantly fewer PV incidents (relational PV $M = 1.61$, $SD = .61$; reputational PV $M = 1.47$, $SD = .66$; overt PV $M = 1.30$, $SD = .49$; cyber PV $M = 1.34$, $SD = .36$) than their non-Hispanic peers (relational PV $M = 1.73$, $SD = .70$; reputational PV $M = 1.64$, $SD = .81$; overt PV $M = 1.38$, $SD = .54$; cyber PV $M = 1.41$, $SD = .50$; all p 's < .05). PV experiences were found to be stable over time and correlated (relational PV r 's = .42 - .57 across time; reputational PV r 's = .41 - .58 across time; overt PV r 's = .48 - .62 across time; cyber PV r 's = .44 - .56 across time).

Adolescents reported low levels of general anxiety, a construct that exhibited strong stability over time (r 's = .61 - .68 across time). Similarly, adolescents reported low levels of somatic complaints (T-scores 53-56; r 's = .61 - .70 across time) and low levels of sleep deficit complaints (r 's = .51 - .60 across time). Regarding excess sleep complaints, adolescents reported experiencing this symptom between never and sometimes, and reported minimal symptom variability (r 's = .44 - .50 across time).

Correlations among all study variables were examined at each time point (see Tables 3, 4, and 5). Of note, at each time point the four PV types were significantly, positively correlated with all potential mediating and outcome variables, providing support for the path model examined in Aims 2 and 3. Demographic variables (age, gender, ethnicity) that were significantly related to a study construct at *any* time point were included and controlled for in Aims 2 and 3 analyses.

Specific Aim 1: Test an Empirical Model of PV in Adolescents via Latent Class Analysis (LCA) and Latent Profile Analysis (LPA)

First, to replicate the findings of Wang et al. (2010), an LCA was conducted using Mplus Version 6.11 (Kline, 2011; Muthen & Muthen, 2011; see Figure 2). In order to do this, we attempted to match the eight categorical PV items used by Wang et al. (2010) with similar items from the Time 1 R-PEQ and C-PEQ (see Table 1, Figure 2). However as noted above, C-PEQ #9 was dropped from the analyses due to unacceptable skewness and kurtosis; as such, seven items were used in the LCA. Similar to Wang et al., these seven items were scored categorically (see Table 1), to determine if the three-class outcome found by Wang and colleagues generalized to an older adolescent sample. Demographic variables, including gender, ethnicity (Caucasian vs. non-Caucasian, as in Wang et al., 2010), and grade were included as covariates.

Consistent with study hypotheses (Hypothesis 1.1), results indicated that a three-class solution best fit the data (BIC = 8024.35, Lo-Mendell-Rubin Test $p < .0001$, Bootstrapped Likelihood Ratio Test $p < .0001$, entropy = .78; see Table 6 for two, three, and four class solution results; see Figure 3). Similar to the findings of Wang et al., this model was characterized by: a) a low PV class ($n = 517$; 55% of sample), b) an interpersonal PV class ($n = 365$, 35% of sample), and c) an overt/reputational PV class ($n = 105$; 10% of sample; see Table 6; see Figure 3). Most adolescents fell within the low PV class. The next most common class, interpersonal PV, was primarily identified by the following items: “Some teens left me out of an activity or conversation that I really wanted to be included in (Relational)”, “A teen tried to damage my social reputation by spreading rumors about me (Reputational)”, “A teen said mean things about me so that people would think I was a loser (Reputational)”, “A teen teased me in a mean way, by

saying rude things, or calling me bad names (Reputational)”, and “A peer sent me a mean message via electronic media (Cyber)”). Finally, the least common class, overt/reputational PV, was primarily identified by the following items: “A teen hit, kicked, or pushed me in a mean way (Overt),” and “A teen teased me in a mean way, by saying rude things, or calling me bad names (Reputational).”

Further, as hypothesized, gender and grade were found to be significant covariates of class membership (Hypothesis 1.4). When compared to the low PV class, those in the interpersonal PV class were more likely to be female ($\beta = .41, p < .05$) and more likely to be younger ($\beta = -.24, p < .01$). These findings were consistent with expectations that more females than males would be represented within an interpersonal PV class. Further, compared to the low PV class, partially as expected, those in the overt/reputational PV class were more likely to be male ($\beta = -2.47, p < .01$) and more likely to be younger ($\beta = -.38, p < .05$). Consistent with expectations, ethnicity was not a significant covariate of class membership in the LCA.

Based on these results, the data partially fit the pattern obtained by Wang and colleagues (2010), and Hypothesis 1.1 was only partially supported. Similar to Wang et al.’s (2010) results, our data indicated that a three class solution fit best, and that two of those classes are identified by low PV experiences and primarily interpersonal PV experiences, respectively (see Figure 3). However, Wang et al.’s (2010) third class was identified as being polyvictimized (i.e., physical, verbal, cyber, social exclusion, rumor spreading), whereas our data suggested that the third class was comprised of those reporting primarily overt and reputational PV experiences. Further, our data were generally consistent with expectations regarding the effects of gender and ethnicity

(Hypothesis 1.4); in the interpersonal PV class adolescents were more likely to be female, in the overt/reputational PV class adolescents were more likely to be male, and ethnicity was not a significant covariate of class membership.

Second, to address the hypothesis that three or more PV profiles would emerge when a comprehensive list of continuously scored items was used to assess PV (Hypothesis 1.2), a series of LPAs were conducted. Specifically, the Time 1 sample was split into two subsamples (subsample A and B), based on random assignment in SPSS. An LPA was conducted using Mplus Version 6.11 (Muthen & Muthen, 2011) on subsample A. The PV profiles were based on adolescents' responses on the nine R-PEQ items and the nine C-PEQ items at Time 1, scored continuously (Kline, 2011). Demographic variables included as covariates in the LPA were gender, grade, and ethnicity (Hispanic vs. non-Hispanic, given the Hispanic majority composition of the sample).

Results indicated that a one-class solution best fit the data (two class solution BIC = 18404.84, Lo-Mendell-Rubin Test $p = .52$, entropy = .94, indicating that there was not statistical support to differentiate even two classes; see Table 7 for two, three, and four class solution results; see Figure 4). As such, Hypothesis 1.2 was not supported, and the use of continuously scored items did not provide additional gradation in PV profiles.

An LPA was conducted on subsample B in order to test and confirm the results found with subsample A (see Table 8 for two, three, and four class solution results; see Figure 5). Again, results indicated that a one class solution best fit the data (two class solution BIC = 18468.04, Lo-Mendell-Rubin Test $p = .77$, entropy = .93, indicating that there was not statistical support to differentiate even two classes; see Table 8; see Figure

5); this provided support for Hypothesis 1.3, in which it was expected that results from subsample A would be replicated in subsample B³.

Based on these results, our continuously-scored data did not fit the pattern obtained by Wang and colleagues (2010). Based on the LPA series, the data are best represented by only one PV class, characterized by low levels of all PV types. Further, given that the LPA series identified a one-class solution, gender and ethnicity could not be assessed as potential covariates (per Hypothesis 1.4).

Specific Aim 2: Examine the Prospective Associations Between PV Experiences and Physical Health Problems in Adolescents

From this point forward, a variable-centered approach was adopted for study analyses. It was hypothesized that each PV type would significantly and uniquely predict adolescents' somatic and sleep complaints. Given the limited research examining the relationships between specific PV types and physical health, however, no predictions were made regarding the relative strength of each PV predictor.

To examine the stability of the PV types (overt, relational, reputational, and cyber), general anxiety symptoms, somatic complaints, sleep deficit complaints, and excess sleep complaints across time, repeated measures ANOVAs were conducted for each construct across Time 1, Time 2, and Time 3. None of the repeated measures ANOVAs were significant ($p > .05$), and as such, construct means did not differ significantly across the current study time frame.

³ An LPA was also conducted using continuously-scored summary score variables for overt, relational, reputational and cyber PV instead of individual items. No differences were found in the results, and again, a one-class solution best fit the data (two class solution BIC = 8418.97, Lo-Mendell-Rubin Test $p = .38$, entropy = .92, indicating that there was not statistical support to differentiate even two classes).

Given the lack of change demonstrated across all study constructs, latent variables were created for each of the four types of PV: overt, relational, reputational, and cyber (each based on Time 1, Time 2, and Time 3 summary scores; procedures described in Measures section). Similarly, three additional latent variables were created reflecting somatic complaints, sleep deficit complaints, and excess sleep complaints (each based on Time 1, Time 2, and Time 3 summary scores; procedures described in Measures section). A structural model was tested where overt, relational, reputational, and cyber PV were used to predict somatic, sleep deficit, and excess sleep complaints. Each latent variable's relevant demographic covariates were controlled for, based on significant bivariate correlation values (see Figure 6). This model fit the data well, $\chi^2(202) = 706.26$, CFI = .95, RMSEA = .05, SRMR = .04. Somatic complaints was significantly, directly associated with relational PV ($\beta = .13, p < .01$), reputational PV ($\beta = .12, p < .05$), and cyber PV ($\beta = .22, p < .01$). Sleep deficit complaints was significantly, directly associated with cyber PV ($\beta = .25, p < .01$). Excess sleep complaints was significantly, directly associated with reputational PV ($\beta = .15, p < .01$); cyber PV trended towards significance ($\beta = .14, p < .10$).

Based on these results, Hypothesis 2 was partially supported. With all variables controlled, relational, reputational, and cyber PV were each significantly, directly associated with at least one physical health problem; however no PV type was significantly, directly associated with all three physical health outcomes. Further, overt PV was not significantly associated with any physical health problem.

Specific Aim 3: Examine the Role of Anxiety as a Mediator of the Prospective Relationship Between PV Experiences and Physical Health Problems in Adolescents

To examine the role anxiety may play in the relationship between PV and physical health, a latent variable was created reflecting general anxiety (based on Time 1, Time 2, and Time 3 summary scores; procedures described in Measures section). It was hypothesized (Hypothesis 3) that general anxiety would function as a partial mediator of the relationship between youth PV experiences and their physical health problems. However, as only partial mediation was hypothesized, we also expected that a significant direct path between PV experiences and physical health problems would exist.

To test this hypothesis, a structural model was first examined where overt, relational, reputational, and cyber PV were used to predict general anxiety, while controlling for each latent variable's relevant demographic variables (based on significant bivariate correlation values; see Figure 7). This model fit the data well, $\chi^2(98) = 386.14$, CFI = .96, RMSEA = .05, SRMR = .04. Relational PV was significantly associated with general anxiety ($\beta = .34, p < .001$). No other PV type was significantly associated with adolescent general anxiety.

Next, a structural model was tested where general anxiety was used to predict somatic, sleep deficit, and excess sleep complaints, while controlling for each latent variable's relevant demographic variables (based on significant bivariate correlation values; see Figure 8). This model fit the data well, $\chi^2(60) = 338.91$, CFI = .95, RMSEA = .06, SRMR = .03. General anxiety was significantly associated with somatic complaints ($\beta = .68, p < .001$), sleep deficit complaints ($\beta = .48, p < .001$), and excess sleep complaints ($\beta = .25, p < .001$).

Finally, a structural model was tested where overt, relational, reputational, and cyber PV were used to predict general anxiety, somatic, sleep deficit, and excess sleep complaints, while controlling for each latent variable's relevant demographic variables (based on significant bivariate correlation values). Further, general anxiety was also used to predict somatic, sleep deficit, and excess sleep complaints in an effort to see if this construct functions like a mediator between PV and physical health (see Figure 9 for complete model; see Figure 10 for reduced version of model). The model fit the data well, $\chi^2(265) = 1017.64$, CFI = .93, RMSEA = .05, SRMR = .04. As above, only relational PV was significantly associated with general anxiety ($\beta = .34, p < .001$). Cyber PV ($\beta = .21, p < .01$) and general anxiety ($\beta = .62, p < .001$) were significantly associated with somatic complaints; relational PV trended towards significance ($\beta = -.08, p < .10$). Relational PV ($\beta = -.14, p < .01$), cyber PV ($\beta = .25, p < .001$), and general anxiety ($\beta = .46, p < .001$) were significantly associated with sleep deficits. Finally reputational PV ($\beta = .14, p < .05$) and general anxiety ($\beta = .17, p < .001$) were significantly associated with excess sleep; cyber PV trended towards significance ($\beta = .14, p < .10$).

In addition, three significant indirect relationships were found. Specifically, patterns were consistent with general anxiety mediating the association between relational PV and each of the three physical health problems: somatic complaints ($\beta = .21, p < .001$), sleep deficit complaints ($\beta = .15, p < .001$), and excess sleep complaints ($\beta = .06, p < .001$). The current model explained 23% of the variance in general anxiety, 56% in somatic complaints, 30% in sleep deficit complaints, and 12% in excess sleep complaints. When the full structural model was tested against a reduced model that included only the significant direct and indirect paths, no significant difference was found

($\chi^2(5) = 7.46, p = .19$). This indicates that the reduced, more parsimonious, model does not significantly worsen model fit.

As a follow-up analysis, the path model was re-examined, eliminating potential item overlap between the anxiety items on the RCMAS-2 and the measures of somatic and sleep symptoms. Specifically, the three items that were removed from the RCMAS-2 were #1 (“Often I feel sick to my stomach”), #5 (“I have too many headaches”), and #7 (“I wake up scared sometimes”). When these items were removed from the general anxiety summary scores at Time 1, Time 2, and Time 3, all analyses outlined in Study Aim 3 were re-run, using this abbreviated general anxiety construct. No structural differences were found, and the model again fit the data ($\chi^2(270) = 930.39, CFI = .94, RMSEA = .05, SRMR = .04$). Further, general anxiety was again found to act as a mediation-like variable between relational PV and somatic ($\beta = .16, p < .001$), sleep deficit ($\beta = .12, p < .001$), and excess sleep complaints ($\beta = .06, p < .01$).

Based on these results, Hypothesis 3 was partially supported. General anxiety did function like a mediator between PV and physical health problems, however this was true only for relational PV. No other PV type was significantly associated with general anxiety symptoms; thus, general anxiety was not able to function like a mediator for reputational, overt, or cyber PV. Alternatively, direct relationships were found between relational PV and sleep deficits and somatic complaints (trending); between reputational PV and excess sleep; as well as between cyber PV and somatic complaints, excess sleep, and sleep deficits.

CHAPTER 4: DISCUSSION

Research has repeatedly documented the negative effects PV may have on adolescents' mental health and well-being. However, considerably less is known about the ways PV may impact adolescents' physical health. This study addressed several gaps in our conceptualization of PV by evaluating a recently published empirical model, and by examining the relationship between PV and physical health problems, including potential mediational pathways. To our knowledge, this is the first study to concurrently and uniquely examine the associations between relational, reputational, overt, and cyber PV and physical health symptoms in adolescents. Key findings include the partial replication of Wang et al.'s (2010) three-class model, characterized in part by a low PV class and an interpersonal PV class. Additionally, we identified relationships between relational, reputational, and cyber PV and adolescents' physical health, some of which displayed partial mediation-like relationships by general anxiety. These key issues will be discussed in depth in the section that follows.

Testing an Empirical Model of PV

Based on the current study's LCA analyses, Wang and colleagues' (2010) empirical model of PV was partially replicated. Similar to Wang, a three-class solution, identified in part by a low PV class and an interpersonal PV class, fit the current study sample. In both Wang et al.'s (2010) study and the current sample, the majority of adolescents reported experiencing low levels of PV across all types. This is a positive and encouraging finding, as it indicates that approximately half of youth endorse low levels of PV across the pre-adolescent and adolescent developmental stages, time periods characterized by the increasing importance of peer relationships. Further, of those

adolescents who reported experiencing PV, results from both the current study and Wang et al. (2010), indicate that interpersonal forms of PV – including rumor spreading, social exclusion, and verbal PV experiences – appear most prevalent. This finding highlights the importance of peer relationships and friendships in youth and suggests that interpersonal forms of PV become increasingly important as youth move into the adolescent and teenage years.

Further, results from the current study replicate Wang et al.'s (2010) finding that females were more likely to be in an interpersonal PV class than males. This is consistent with previous research that has found interpersonal forms of PV, namely relational and reputational PV, to be especially prevalent and pernicious during adolescence, particularly for girls (La Greca & Harrison, 2005; Siegel et al., 2009). However, in the current sample, the third class was identified primarily by overt and reputational PV items, whereas Wang et al.'s (2010) third class was identified by high levels of all PV types. (In both studies males were more likely to be represented in this third PV class than females.) Further, contrary to expectations, the current study's LPA analyses (based on 18 PV items scored continuously) indicated that a one-class solution identified by generally low PV best fit the data.

The results of the LCA and LPA analyses could be interpreted multiple ways. It is possible that the differences noted between Wang et al.'s (2010) and the current study's results are primarily a function of adolescent age. Wang and colleagues' (2010) sample was younger (6th – 10th grade) than the current sample (9th – 12th grades). Given that PV experiences may shift in terms of their complexity and subtlety with age (Parker, Rubin, Price, & DeRosier, 1995; Prinstein et al., 2001), with overt PV occurring less often as

adolescents get older (Parker et al., 1995; Prinstein et al., 2001), the differing age levels of the two samples might help to explain the different findings. This argument is supported by the fact that overt PV was negatively correlated with age in the current study, indicating that the frequency of experiencing overt PV declines as youth become older. Further, as our other findings revealed, overt PV was not a significant predictor of any physical health problems or general anxiety symptoms. For adolescents, then, it appears that the frequency of experiencing overt PV may decline and its impact on mental and physical health lessen, in deference to the more subtle and potentially more damaging forms of interpersonal PV.

It is also possible that the differences noted between Wang et al.'s (2010) findings and the current study's results are a function of ethnicity. Approximately 26% of Wang et al.'s (2010) sample identified as Hispanic, whereas approximately 80% of the current study's sample identified as Hispanic. Based on their LCA findings, Wang et al. (2010) reported Hispanic adolescents were less likely to be in Class 2 (interpersonally victimized) compared to Class 3 (low levels of PV), suggesting that the PV experiences of Hispanic adolescents differ from their non-Hispanic counterparts. Based on Wang et al.'s (2010) results, it is possible that Hispanic adolescents may be less likely to experience PV compared to non-Hispanic adolescents⁴. This argument is supported by the fact that at Time 1, Hispanic participants reported significantly lower mean levels of each PV type, compared to non-Hispanic participants. This interpretation is also consistent with the current study's LPA results, which indicated that a one-class solution, identified by low levels of all PV types, best fit the (primarily Hispanic) adolescent

⁴ Note: No ethnic differences were found in the current study's LCA analyses, likely as a result of the large representation of Hispanic youth in the sample.

sample. This interpretation may also help explain the differing third classes identified by LCA in the current study and Wang et al. (2010); specifically, in the current study, the fewer PV types identified in the third class suggest that Hispanic adolescents experience less frequent and/or a more limited range of PV than non-Hispanics (again consistent with mean differences identified in each PV type at Time 1). This interpretation is consistent with previous research that found the prevalence of victimization to be lower among Hispanic adolescents, when compared to their White and Black peers (Juvonen et al., 2003), however additional research is needed to clarify this issue.

Another interpretation of the different and essentially null findings we obtained from the LPA analyses is that it may not be possible to identify distinct PV classes. The current study's three-class LCA solution was the best fit for our sample, but it was not a strong fit for the data. Further, the LPA results indicated that a one-class solution best fit the data, which was surprising as it had been hypothesized that the LPA would be *more* sensitive to identifying PV patterns. Considering these findings, it is possible that LCA forces participants into unstable PV classes that do not actually exist, and rather, the severity of PV is what actually differentiates groups of adolescents.

Briefly, it is also possible the differences noted between Wang et al. (2010) and the current study are due to the differing measures used. Although the current study attempted to match Wang et al.'s (2010) items as closely as possible, the overlap was not exact. In particular, Wang and colleagues' (2010) items related to being called mean names about race, color, or religion did not overlap with the PV items used in the current study; however, specific questions regarding race, color, or religious-based victimization are not generally included in measures of PV, and appear to be the exception rather than

the norm. As such, the measure employed in the current study, the widely-used Revised Peer Experiences Questionnaire, may be a more representative measure of PV.

Direct Associations Between PV and Physical Health Problems

In line with research that has documented a prospective link between PV and mental health in adolescents, the current study suggests that PV might also negatively affect physical health in teens. Specifically, relational, reputational, and cyber PV were directly associated with adolescents' somatic complaints; cyber PV was directly associated with sleep deficit complaints; and reputational PV was directly associated with excess sleep complaints, with cyber PV also trending as a predictor. As noted above, overt PV was not significantly associated with any physical health outcome, when considered concurrently with other PV types. Rather, it appears that interpersonal forms of PV, occurring both in-person and online, are significantly, directly, and positively associated with youth's physical health problems in a variety of domains. Thus, it is possible that the more frequent and more sophisticated, covert, and sometimes anonymous (particularly in the case of cyber PV) nature of interpersonal PV takes a significant toll on adolescents' physical health problems, specifically somatic complaints and sleep problems

These results are in line with previous research that has found PV to be associated with physical health problems in adolescents both concurrently and prospectively (Natvig et al., 2001; Rigby, 1998, 1999). The current study extends previous research, however, by assessing the *unique effects* of each PV type as well as by separating somatic from sleep-related problems, unlike prior studies (e.g., Houbre et al., 2006; Natvig et al., 2001; Rigby, 1998; Rigby, 1999; Williams et al., 1996). This more nuanced examination of PV

and physical health problems suggests that interpersonal PV, occurring both in-person and online, may be especially detrimental to adolescent physical health.

Concerning in-person interpersonal forms of PV, relational and reputational PV each displayed significant, unique associations with somatic and sleep symptoms. Specifically, relational PV was directly associated with somatic complaints; reputational PV was directly associated with somatic and excess sleep complaints. These findings suggest that relational and reputational PV may have a differential impact on adolescent physical health functioning. Both relational and reputational PV were directly associated with adolescent somatic symptoms, but only reputational PV was directly associated with excess sleep.

It is possible that this differential association may be function of the public nature of reputational PV. Whereas others may or may not be aware of relational PV occurring, by its nature, reputational PV is done for its impact and recognition by others. Further, because of its public nature, reputational PV may be more difficult to avoid or ignore, compared to relational PV. For example, an adolescent can choose to ignore when s/he is not invited to an event and/or may downgrade the perceived importance of said event (relational PV); alternatively, an adolescent may find it more difficult to ignore or avoid a rumor if his/her friends, classmates, and peers are repeatedly discussing said rumor in and outside of school and confronting him/her about it (reputational PV). It is possible that the more public nature of reputational PV contributes to symptoms of depression (De Los Reyes & Prinstein, 2004; La Greca & Harrison, 2005; Salmivalli, Sainio, & Hodges, 2013; Wang et al., 2010), and excess sleep may be a manifestation of depressive affect.

Additional longitudinal research will be necessary to examine this differential relationship between relational and reputational PV and adolescent sleep symptoms.

Considering online interpersonal PV, cyber PV appears to encompass aspects of both relational and reputational PV, making it an especially perilous stressor. For example, adolescents may discover through social media that they were excluded from an event or party (relational PV) or may experience public embarrassment and shame when a peer posts a humiliating comment or photo on their social networking page (reputational PV). As such, cyber PV may share characteristics of each interpersonal PV type. Further, cyber PV may be more globally harmful to adolescents' physical health due to its constant nature (i.e., even if an adolescent is not currently logged on to his/her Facebook account, s/he may get a notification that a peer has posted a mean comment or photo). The decreased ability to escape cyber PV, as compared with the traditional (off-line) forms of PV from which escape or avoidance is more possible, may heighten the negative impact of cyber PV. This interpretation is supported by current findings indicating that cyber PV was significantly, directly associated with somatic, excess sleep, and sleep deficit complaints, making it the only PV type significantly, directly associated with all three physical health outcomes.

The current study adds to the existing literature base, then, by highlighting the importance of PV experiences in adolescence, particularly interpersonal forms of PV, and linking these PV types to somatic and sleep symptoms. These findings have potential implications for assessment and intervention, including assessing the interpersonal experiences of youth who are experiencing somatic and sleep concerns. Further, this research suggests that cyber victimized youth may require education on safe and

appropriate online/social media usage, in an effort to make them less vulnerable to cyber PV. It must be acknowledged, however, that the causal and temporal sequence of these relationships cannot be definitively determined based on current analyses. It is possible that physical health problems in adolescence may contribute to PV experiences. For example, adolescents with multiple somatic complaints may be less desirable to interact with, and thus elicit more relational and reputational aggression from their peers; alternatively, youth with somatic and sleep symptoms may miss significant portions of school, thereby weakening their interpersonal skills and relationships, and putting them at risk for interpersonal aggression. Further prospective studies are needed to clarify the direction, including the possible cyclical nature, of these relationships.

Role of Anxiety As a Mediator-Like Variable between Relational PV and Physical Health Problems

Based upon the path model analyzed in the current study, it appears that general anxiety may function as a partial mediator-like variable of the relationship between relational PV and physical health problems. Specifically, youth who experience relational PV also report higher levels of general anxiety, as well as more somatic symptoms, sleep deficits, and excess sleep. Relational PV may be especially anxiety provoking for adolescents, because it is considered the most personal type of PV, as it is generally initiated by friends and close peers (Crick, Casas, & Nelson, 2002; Siegel et al., 2009). Given the significance of peer relationships in adolescence, it is not surprising that anxiety symptoms, such as fear and worry, would be associated with experiences of relational PV. Relational PV is likely to peak a teen's concern about their social standing and status, in turn leading to discomfort and worry, which may be reflected in general anxiety symptoms (Siegel et al., 2009). This anxiety, in turn, may contribute to somatic

and sleep symptoms (Alfano et al., 2007; Bardone et al., 1998). Further, previous research has shown that anxiety is both predicted by and a predictor of PV over time (Siegel et al., 2009), thus it is possible that youth experiencing heightened levels of anxiety in response to PV in fact make themselves more likely to experience additional victimization over time. PV, particularly relational PV, may become an accumulative and chronic stressor, which in turn may negatively impact youth's physical health symptoms (i.e., McEwen, 2012).

Surprisingly, general anxiety did not display a mediation-like relationship between reputational, cyber, or overt PV and any of the physical health problems. This was unexpected, particularly given the similarities of relational and cyber PV. It is possible, though, that cyber and reputational PV impact adolescent physical health through alternative mediators, such as depressive symptoms. As discussed above, cyber and reputational PV are each stressors that may be difficult to escape or avoid, and also are more public than other forms of PV. In particular, both in-person and online rumors and character defamation may spread widely and quickly; an adolescent who is experiencing cyber or reputational PV may find it difficult to evade or extinguish this type of victimization. Cyber and reputational PV may also occur anonymously (i.e., an adolescent may discover a rumor has been spread about them, without knowing the source of the rumor). The potential anonymity associated with cyber and reputational PV may produce feelings of helplessness and lack of control, which are symptoms of depression. This hypothesis regarding the potential mediating role of depressive symptoms is in line with existing research that has found PV experiences and negative friend/relationship qualities to be associated with depressive and emotional symptoms

(La Greca & Harrison, 2005; Stadler, Feifel, Rohrman, Vermeiren, & Poustka, 2010; Wang et al., 2010). Further, high Internet usage and cyber PV, specifically, has also been associated with symptoms of depression and loneliness (Belanger, Akre, Berchtold, & Michaud, 2011; Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay, & Scherlis, 1998; Wang et al., 2010), as well as poorer physical health (Belanger et al., 2011; Wang et al., 2010). Considered within the context of extant research, cyber and reputational PV may be associated with physical health problems in adolescents via depressive symptoms, rather than general anxiety symptoms, although this remains to be tested in future studies.

Along with Biebl and colleagues (2011), this study represents one of the first to examine potential causal mechanisms linking PV with physical health problems over time. Future research should assess adolescent PV, general anxiety, and physical health problems across a more extended period of time, with greater time between assessment points, in order to more fully understand the temporal and possibly cyclical nature of these constructs. Additionally, future research should also consider alternative mediators, such as depressive symptoms (La Greca & Harrison, 2005; Prinstein et al., 2001; Vernberg, 1990), in an effort to understand the mechanisms of action between reputational and cyber PV and physical health problems in adolescents.

Limitations

Despite the many strengths of this study, certain limitations require note. First, concerning the LCA analyses, we were unable to match the items used by Wang and colleagues (2010) exactly, and one item was dropped due to unacceptable levels of skewness and kurtosis. As such, our study was not a precise replication of Wang and colleagues (2010), even though our item and content overlap was significant. Future

research should attempt to use Wang and colleagues' (2010) *exact* items (in addition to others), to explore differences in PV experiences across ages, developmental periods, and ethnicities. By matching Wang's (2010) items exactly, future researchers may be able to make more definitive statements regarding the increased subtlety and sophistication of PV experiences in older adolescents, as well as the role that ethnicity may play in the experience of PV more broadly.

Second, though our study design was prospective in nature, the time between assessment points was relatively short (approximately six weeks). Because of this, significant changes were not reported for PV experiences or mental and physical health problems over time. As a result, we collapsed our data into larger latent variables, precluding an assessment of the temporal sequence of our constructs. Future prospective research should conduct assessments at longer intervals, in an effort to capture change over time in both PV as well as mental and physical health problems. Further, future research should consider possible bi-directional and cyclical relationships that may exist between these variables, especially between PV and general anxiety.

Third, and related to the short time between assessments, there may have been some overlap in adolescents' ratings of peer victimization and anxiety, as our measures asked adolescents to rate their experiences or symptoms over the previous *two* months. As such, it is possible that adolescents may have reported the same PV experiences or anxiety symptoms at multiple time points, which might have contributed to the lack of change in these constructs. Future prospective research should ensure that any measure used fits appropriately within the assessment timeframe of the study, in order to prevent overlapping measurements.

Fourth, when examining the questionnaire that was used to assess general anxiety, it became apparent that two items potentially overlapped with the somatic symptom items, and one item overlapped with the sleep deficit items. As such, it is possible that shared variance due to item overlap may have contributed to the association between general anxiety and adolescent physical health problems. However, when the relationships between PV, general anxiety, and physical health problems were examined using an abbreviated measure of general anxiety that excluded the three overlapping items, the resulting structural model still fit the data well. Further, a mediation-like relationship was again identified between relational PV and somatic, sleep deficit, and excess sleep complaints (but not for any other PV type). Further research should extend these findings by including alternative measures of general anxiety and physical health outcomes, such as nurse or doctor report, to minimize this item overlap.

Fifth, our overall participation rate, based on the number of parental consent forms distributed, was somewhat low (45%). It is possible that adolescents who did not participate were somehow different from our study sample, as they may have had higher PV symptoms, as well as higher mental and/or physical health problems. Further, because the current study sample reported generally low levels of PV, general anxiety, and physical health problems, it may have been statistically difficult to detect true relationships between our constructs of interest. Future research should replicate this work with a targeted sample of adolescents who endorse either more frequent PV experiences and/or more elevated mental and physical health problems in an effort to determine if our findings are maintained in a targeted sample.

Finally, our study relied on self-report data from adolescents. Although self-report data is the norm in PV research with youth, additional sources of information, such as teacher or peer reports of PV, would be useful to better capture adolescent's true PV experiences, as well as identify potentially important discrepancies between reporters. Further, medical records from the school nurse or reports from students' parents or pediatricians regarding physical health symptoms would be useful to better understand the physical health consequences that result from adolescent PV experiences.

Significance and Innovation

Results from this study provide important insight into the nature of PV in adolescence, as well as the relationship between PV and adolescent physical health. This study was innovative in its measurement of PV, including employing LCA, LPA, and variable-centered approaches. Further, the current study examined multiple PV types, including relational, reputational, overt, and cyber PV, as well as the unique associations with each PV type. These distinctions allowed for a more nuanced understanding of the differential impact of PV type on physical health.

In a similar vein, this study examined both somatic and sleep symptoms in adolescence, a distinction that has not generally been made in the existing literature. By separating somatic and sleep symptoms, the current study was able to identify the various pathways by which PV experiences may impact an adolescent's somatic symptoms, as well as his/her sleep deficit or excess sleep complaints.

Results indicate that PV – particularly interpersonal PV – is a significant issue for adolescents. Adolescents who experience interpersonal PV, whether in-person or online, may experience a variety of negative prospective physical health problems, including

somatic and sleep difficulties. Cyber PV appears to be an especially detrimental stressor for adolescents, and holds the potential to negatively impact adolescents' somatic and sleep health. General anxiety emerged as a potential mediator of the relationship between relational PV and physical health problems, however future research needs to investigate this relationship longitudinally, to establish temporal precedence, and other possible mediators should also be examined.

This information holds important implications for the development of effective PV prevention and intervention programs for adolescents. The results of the current study help to identify important targets of intervention, including both psychological *and* physical health outcomes of peer victimized youth. Alternatively, this research also suggests that youth who present to medical settings with physical health complaints, particularly without a medical explanation, should be asked about interpersonal stressors such as PV. Based on the current study, interpersonal forms of PV, particularly cyber PV, require significant attention in adolescence, as teens who are victimized are likely to experience these more subtle, less blatant forms of PV. Mental and physical health symptoms should be identified and assessed when working with victimized adolescents, and PV should be assessed when working with physically distressed teens, as results of this study suggest PV experiences may have a prospective impact on both mental and physical health. Adolescents who report experiencing cyber PV, in particular, may require psychoeducation regarding safe and appropriate social media usage, in an effort to minimize their risk for experiencing future cyber aggression.

Further, the current study indicates that adolescent general anxiety symptoms should be targeted, in particular, as one possible mechanism of action leading to physical

health problems in peer victimized teens. Considering the strong relationship between relational PV and general anxiety, it is possible that youth who experience prolonged anxiety in response to relational PV experiences may make themselves ‘easy targets’ for future PV experiences (Blote & Westenberg, 2007; Siegel et al., 2009); when such interpersonal stress accumulates over time, physical health problems may develop (McEwen, 2012). Further, youth who experience anxiety in response to relational PV may not be able to adequately and appropriately cope with the victimization experiences (Inderbitzen-Nolan, Anderson, & Johnson, 2007; Siegel et al., 2009), which again, may result in negative physical health consequences (Taylor, Repetti, & Seeman, 1997). Interventions for PV (i.e., Cowie & Olafsson, 2001; Fox & Boulton, 2003; Stevens, De Bourdeaudhuij, & Van Oost, 2000) should be adapted to include information related to coping with anxiety symptoms, as well as developing appropriate in-person and online social skills that may then help limit the likelihood of experiencing PV again in the future.

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Table 1. Latent Class Analysis (LCA) Items

LCA Items	Wang et al. (2010)	Current Study
1	“Being hit, kicked, pushed, shoved around, or locked indoors” (Physical)	“A teen hit, kicked, or pushed me in a mean way” (Overt; RPEQ 16)
2	“Being called mean names, made fun of, or teased in a hurtful way” (Verbal)	“A teen teased me in a mean way, by saying rude things, or calling me bad names” (Reputational; RPEQ 17)
3	“Being called mean names and comments about race or color” (Verbal)	“A teen said mean things about me so that people would think I was a loser” (Reputational; RPEQ 14)
4	“Being called mean names and comments about religion” (Verbal)	“A teen said mean things about me so that people would think I was a loser” (Reputational; RPEQ 14)
5	“Being left out of things on purpose, excluded from their group of friends, or completely ignored” (Social Exclusion)	“Some teens left me out of an activity or conversation that I really wanted to be included in” (Relational; RPEQ 1)
6	“Being the target of other students’ lies or false rumors” (Rumor Spreading)	“A teen tried to damage my social reputation by spreading rumors about me” (Reputational; RPEQ 5)
7	“Being bullied by others using computers, e-mail messages, and pictures” (Cyber)	“A peer posted mean things about me publicly via electronic media”; “A peer tried to get me in trouble with parents, teachers or others by posting pictures or comments about me via electronic media” (Cyber; C-PEQ 5, C-PEQ 9*)
8	“Being bullied by others using cell phones” (Cyber)	“A peer sent me a mean message via electronic media” (Cyber, C-PEQ 12)

Wang et al. (2010) items scored categorically:

Uninvolved = never victimized in the last couple of months

Involved = victimized at least once or twice in the last couple of months

*Item dropped due to unacceptable skewness and kurtosis

Table 2. Means and Standard Deviations for Key Study Variables

	Time 1 Mean (SD)	Time 2 Mean (SD)	Time 3 Mean (SD)
Revised-Peer Experiences Questionnaire			
Relational PV (1-5) ⁺	1.63 (.63) [^]	1.50 (.59)	1.47 (.62)
Reputational PV (1-5) ⁺	1.51 (.70) [^]	1.42 (.66)	1.38 (.64)
Overt PV (1-5) ⁺	1.32 (.50) [^]	1.29 (.54)	1.26 (.51)
Cyber-Peer Experiences Questionnaire			
Cyber PV (1-5) ⁺	1.32 (.38) [^]	1.31 (.42)	1.31 (.45)
Revised Children's Manifest Anxiety Scale-2, Short Form			
General Anxiety (0-10)*	2.38 (2.26)	2.15 (2.36)	2.18 (2.51)
Youth Self Report: Somatic Complaints Subscale			
Sleep Deficit (0-4)*	.99 (1.20)	1.10 (1.27)	1.00 (1.22)
Excess Sleep (0-2)*	.55 (.73)	.52 (.72)	.52 (.73)
Somatic Symptoms (0-18)*	3.45 (3.14)	3.10 (3.27)	3.14 (3.37)

+Scores are means

*Scores are sums

[^] Denotes constructs with significant ethnic differences (Hispanic vs. non-Hispanic); in each instance, Hispanic participants reported significantly lower values

Table 3. Time 1 Correlations Among the Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Sex (girls = 1)	1										
2. Age	-.04	1									
3. Hispanic	.04	-.02	1								
4. R-PEQ Relational PV	.10**	-.03	-.09**	1							
5. R-PEQ Reputational PV	.15***	-.04	-.09**	.39***	1						
6. R-PEQ Overt PV	-.15***	-.09**	-.07*	.26***	.47***	1					
7. C-PEQ Cyber PV	.08**	-.07*	-.10***	.45***	.53***	.36***	1				
8. RCMAS General Anxiety	.22***	-.05	-.02	.37***	.29***	.20***	.27***	1			
9. YSR Sleep Deficit	.10***	-.05	-.03	.22***	.24***	.18***	.25***	.35***	1		
10. YSR Excess Sleep	.08**	-.04	.03	.12***	.17***	.09**	.17***	.18***	.03	1	
11. YSR Somatic Symptoms	.23***	-.07*	-.05	.30***	.32***	.22***	.27***	.53***	.45***	.24***	1

* $p < .05$; ** $p < .01$; *** $p < .001$

R-PEQ: Revised Peer Experiences Questionnaire

C-PEQ: Cyber Peer Experiences Questionnaire

RCMAS: Revised Children's Manifest Anxiety Scale, Second Edition, Short Form

YSR: Youth Self Report, Somatic Complaints Subscale

Table 4. Time 2 Correlations Among the Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Sex (girls = 1)	1										
2. Age	-.04	1									
3. Hispanic	.04	-.02	1								
4. R-PEQ Relational PV	.02	.03	-.06	1							
5. R-PEQ Reputational PV	.11***	-.02	-.04	.43***	1						
6. R-PEQ Overt PV	-.17***	-.04	-.04	.35***	.44***	1					
7. C-PEQ Cyber PV	.01	-.03	-.05	.42***	.50***	.36***	1				
8. RCMAS General Anxiety	.19***	-.08*	-.02	.24***	.19***	.11***	.16***	1			
9. YSR Sleep Deficit	.14***	-.06	-.04	.13***	.18***	.13***	.22***	.37***	1		
10. YSR Excess Sleep	.06*	-.02	.02	.09**	.13***	.08*	.14***	.18***	.12***	1	
11. YSR Somatic Symptoms	.23***	-.10**	-.05	.23***	.27***	.19***	.25***	.54***	.51***	.27***	1

* $p < .05$; ** $p < .01$; *** $p < .001$

R-PEQ: Revised Peer Experiences Questionnaire

C-PEQ: Cyber Peer Experiences Questionnaire

RCMAS: Revised Children's Manifest Anxiety Scale, Second Edition, Short Form

YSR: Youth Self Report, Somatic Complaints Subscale

Table 5. Time 3 Correlations Among the Study Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Sex (girls = 1)	1										
2. Age	-.04	1									
3. Hispanic	.04	-.02	1								
4. R-PEQ Relational PV	-.05	-.01	-.01	1							
5. R-PEQ Reputational PV	.03	-.03	.01	.52***	1						
6. R-PEQ Overt PV	-.19***	-.06	-.05	.44***	.50***	1					
7. C-PEQ Cyber PV	-.03	-.01	-.05	.49***	.50***	.44***	1				
8. RCMAS General Anxiety	.17***	-.04	.02	.25***	.23***	.16***	.21***	1			
9. YSR Sleep Deficit	.14***	-.06	.00	.09**	.16***	.12***	.16***	.33***	1		
10. YSR Excess Sleep	.04	-.02	-.01	.12***	.11***	.11***	.17***	.14***	.12***	1	
11. YSR Somatic Symptoms	.19***	-.04	-.01	.24***	.25***	.19***	.31***	.52***	.52***	.27***	1

* $p < .05$; ** $p < .01$; *** $p < .001$

R-PEQ: Revised Peer Experiences Questionnaire

C-PEQ: Cyber Peer Experiences Questionnaire

RCMAS: Revised Children's Manifest Anxiety Scale, Second Edition, Short Form

YSR: Youth Self Report, Somatic Complaints Subscale

Table 6. Latent Class Analysis Results for 2, 3, and 4 Class Solutions

Time 1	AIC	BIC	Vuong-Lo-Mendell-Rubin Likelihood Ratio Test	Bootstrapped Likelihood Ratio Test	Average Latent Class Probabilities	Entropy	Classes
<i>What we look for . . .</i>	<i>Lower</i>	<i>Lower</i>	<i>Significant</i>	<i>Significant</i>	<i>Higher</i>	<i>Higher</i>	
2 Classes	7998.15	8087.21	$p < .001$	$p < .001$	.90 / .94	.75	413 / 628
3 Classes	7880.86	8024.35	$p < .001$	$p < .001$	.89 / .93 / .83	.78	365 / 571 / 105
4 Classes	7790.47	7988.39	$p < .01$	$p < .001$	.86 / .83 / .86 / .79	.70	198 / 156 / 405 / 282

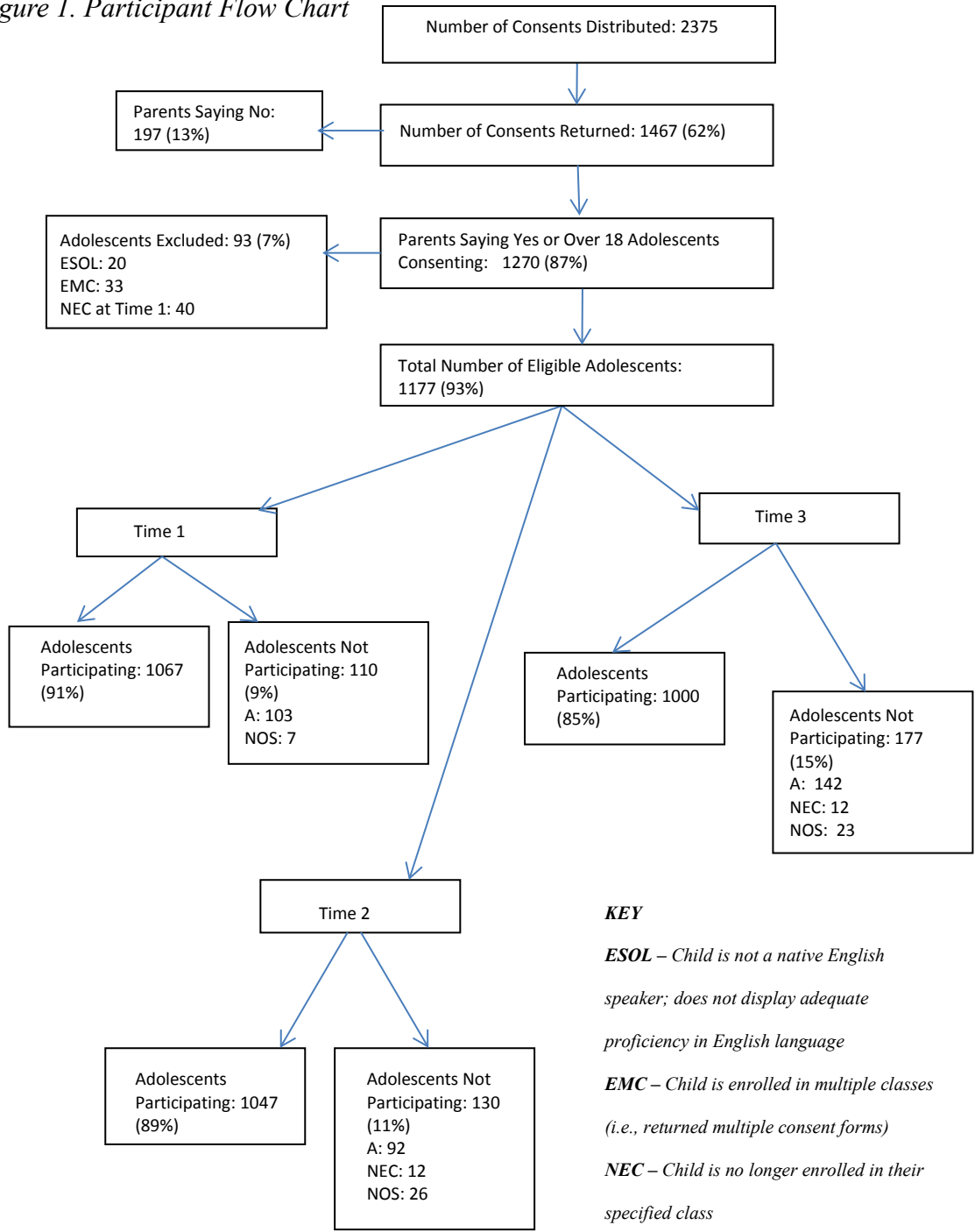
Table 7. Latent Profile Analysis Results for 2, 3, and 4 Class Solutions – Sample A

Time 1	AIC	BIC	Vuong-Lo-Mendell-Rubin Likelihood Ratio Test	Average Latent Class Probabilities	Entropy	Classes
<i>What we look for . . .</i>	<i>Lower</i>	<i>Lower</i>	<i>Significant</i>	<i>Higher</i>	<i>Higher</i>	
2 Classes	18157.13	18404.84	$p = .52$	.96 / .99	.94	421 / 108
3 Classes	17849.42	18191.10	$p = .65$	.99 / .94 / .98	.95	408 / 90 / 31
4 Classes	17613.64	18049.28	$p = .55$	.98 / .92 / .94 / .98	.93	337 / 98 / 52 / 42

Table 8. Latent Profile Analysis Results for 2, 3, and 4 Class Solutions – Sample B

Time 1	AIC	BIC	Vuong-Lo-Mendell-Rubin Likelihood Ratio Test	Average Latent Class Probabilities	Entropy	Classes
<i>What we look for</i>	<i>Lower</i>	<i>Lower</i>	<i>Significant</i>	<i>Higher</i>	<i>Higher</i>	
...						
2 Classes	18219.99	18468.05	$p = .77$	.99 / .95	.93	414 / 118
3 Classes	17662.63	18004.76	$p = .27$	.98 / .94 / 1.00	.93	365 / 145 / 22
4 Classes	17373.67	17809.88	$p < .01$	.98 / .95 / .99 / 1.00	.95	365 / 143 / 23 / 1

Figure 1. Participant Flow Chart



KEY

ESOL – Child is not a native English speaker; does not display adequate proficiency in English language

EMC – Child is enrolled in multiple classes (i.e., returned multiple consent forms)

NEC – Child is no longer enrolled in their specified class

A – Absent

NOS – Child did not participate for a reason not specified above

Figure 2. Replication of Wang et al. (2010) Peer Victimization Latent Class Analysis

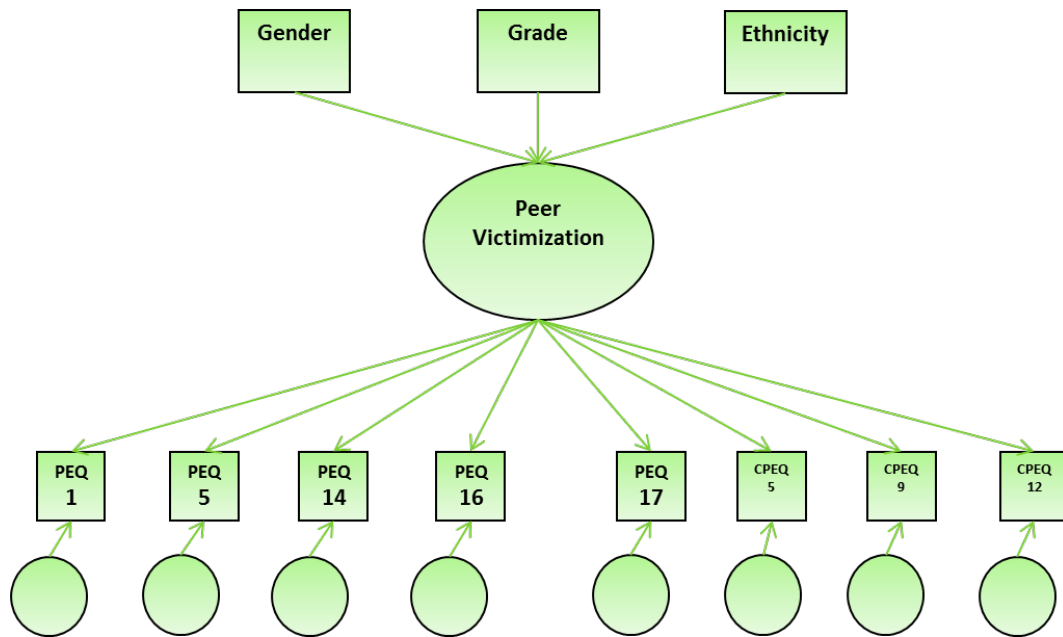


Figure 3. Latent Class Analysis 3 Class Solution

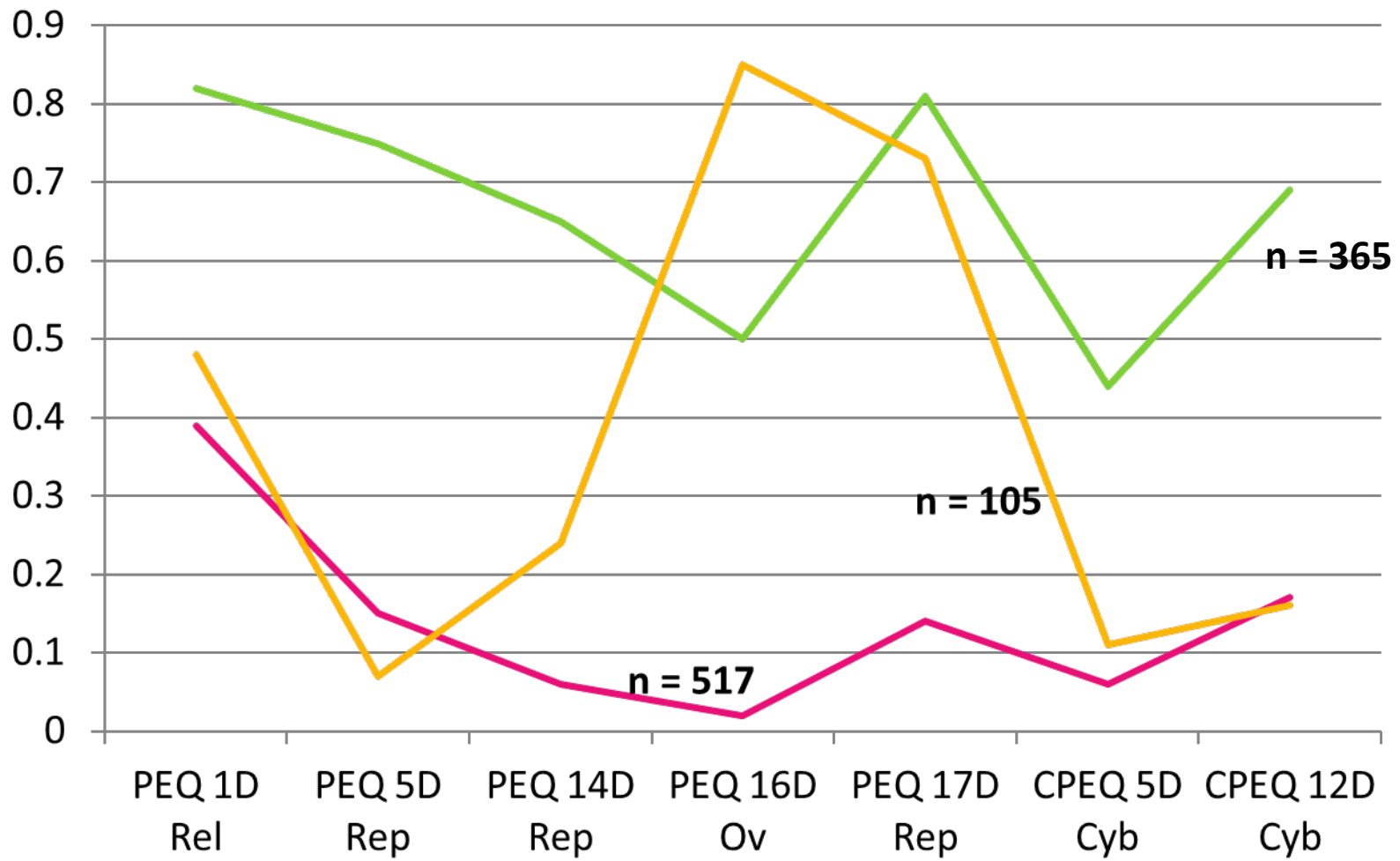


Figure 4. Latent Profile Analysis 2 Class Solution, Subsample A

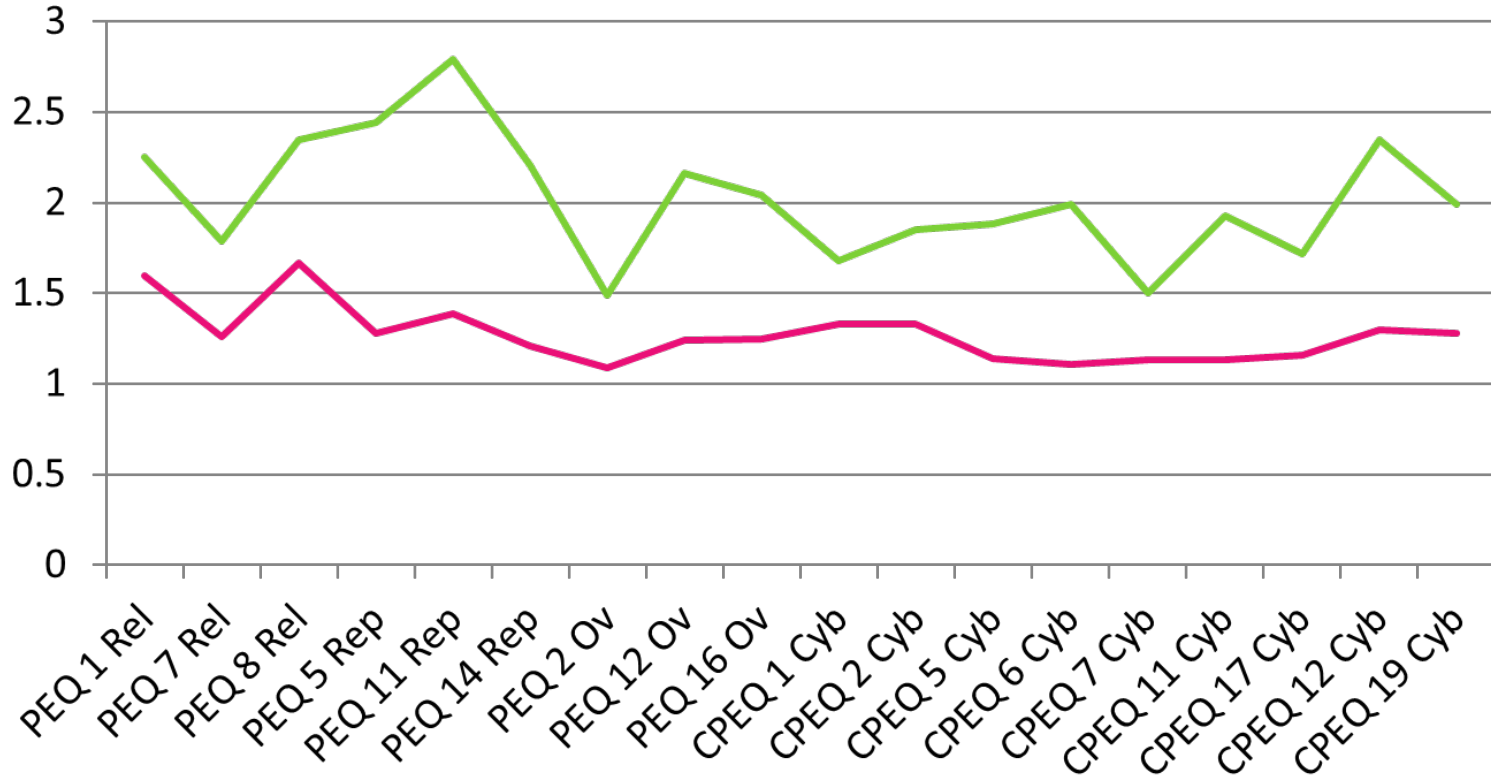


Figure 5. Latent Profile Analysis 2 Class Solution, Subsample B

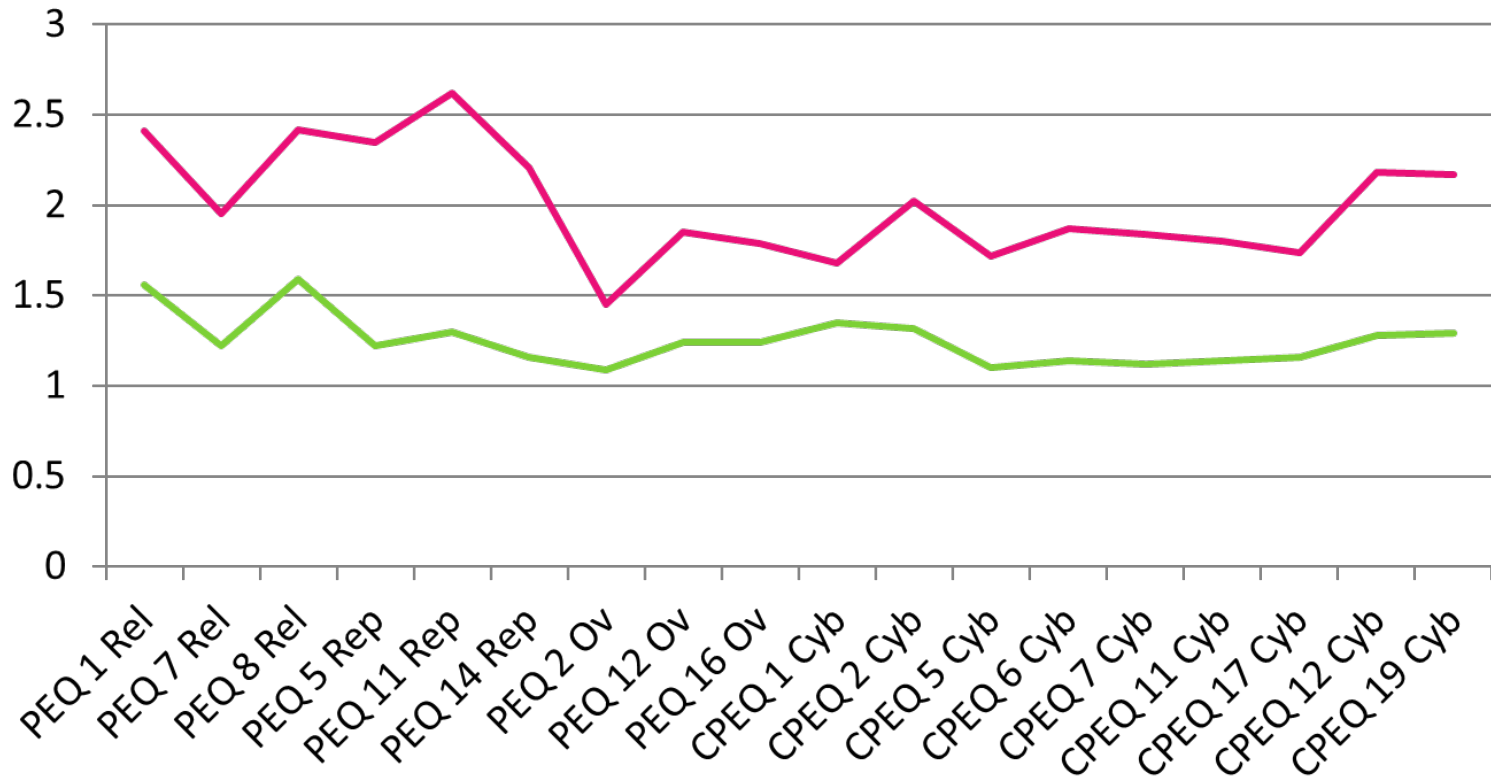


Figure 6. Structural Model: Peer Victimization Predicting Physical Health Problems

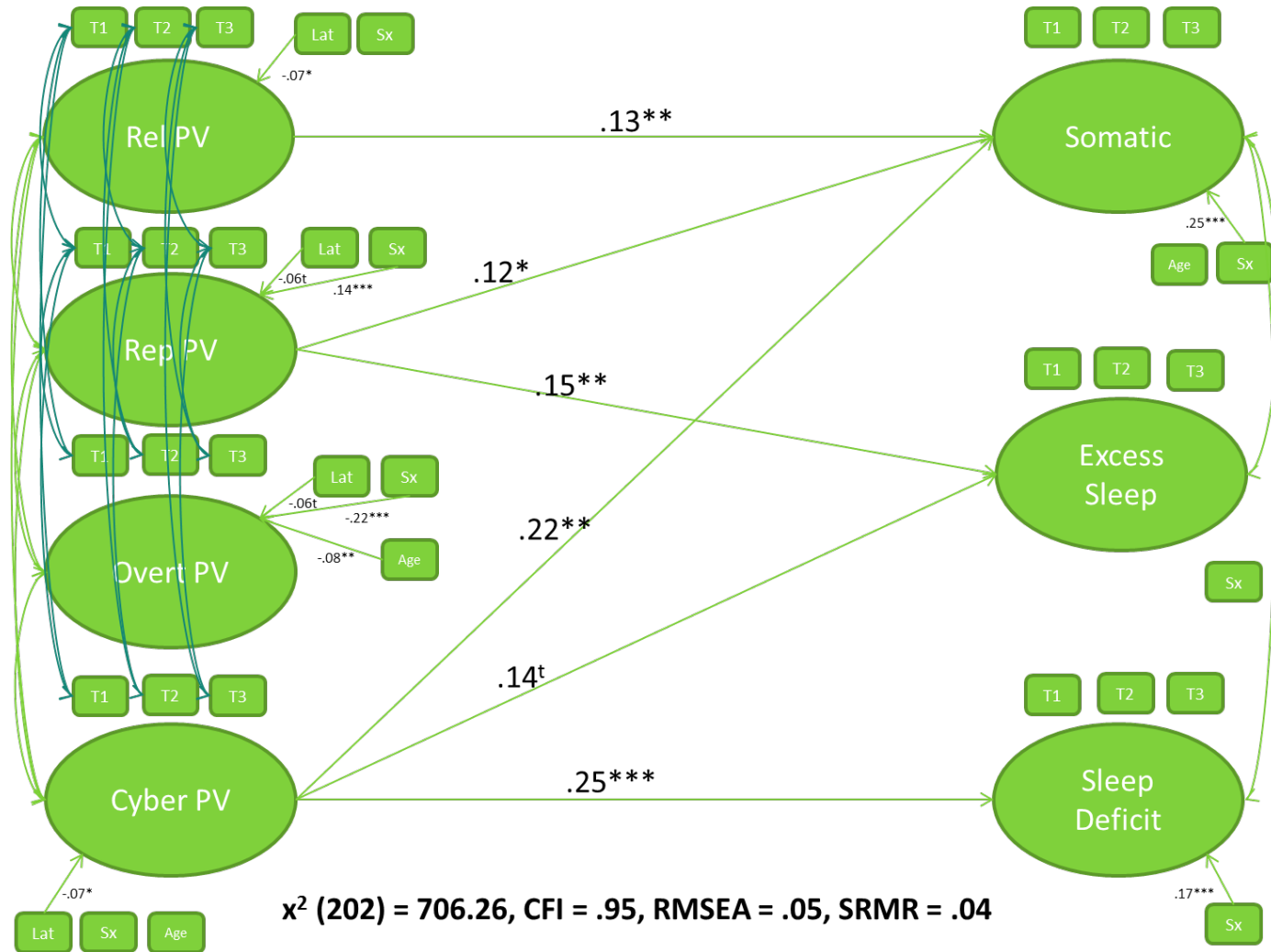


Figure 7. Structural Model: Peer Victimization Predicting General Anxiety Symptoms

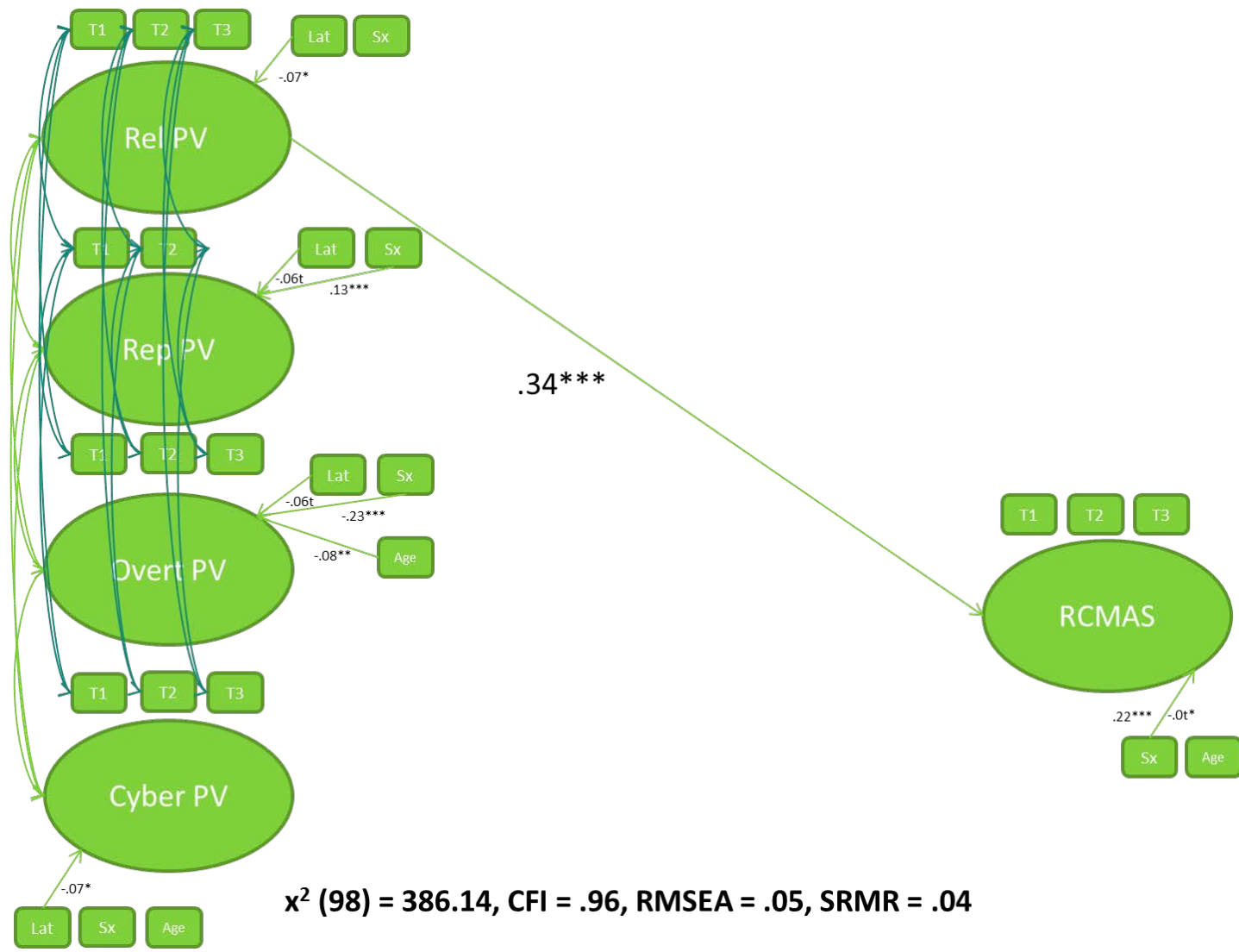


Figure 8. Structural Model: General Anxiety Symptoms Predicting Physical Health Problems

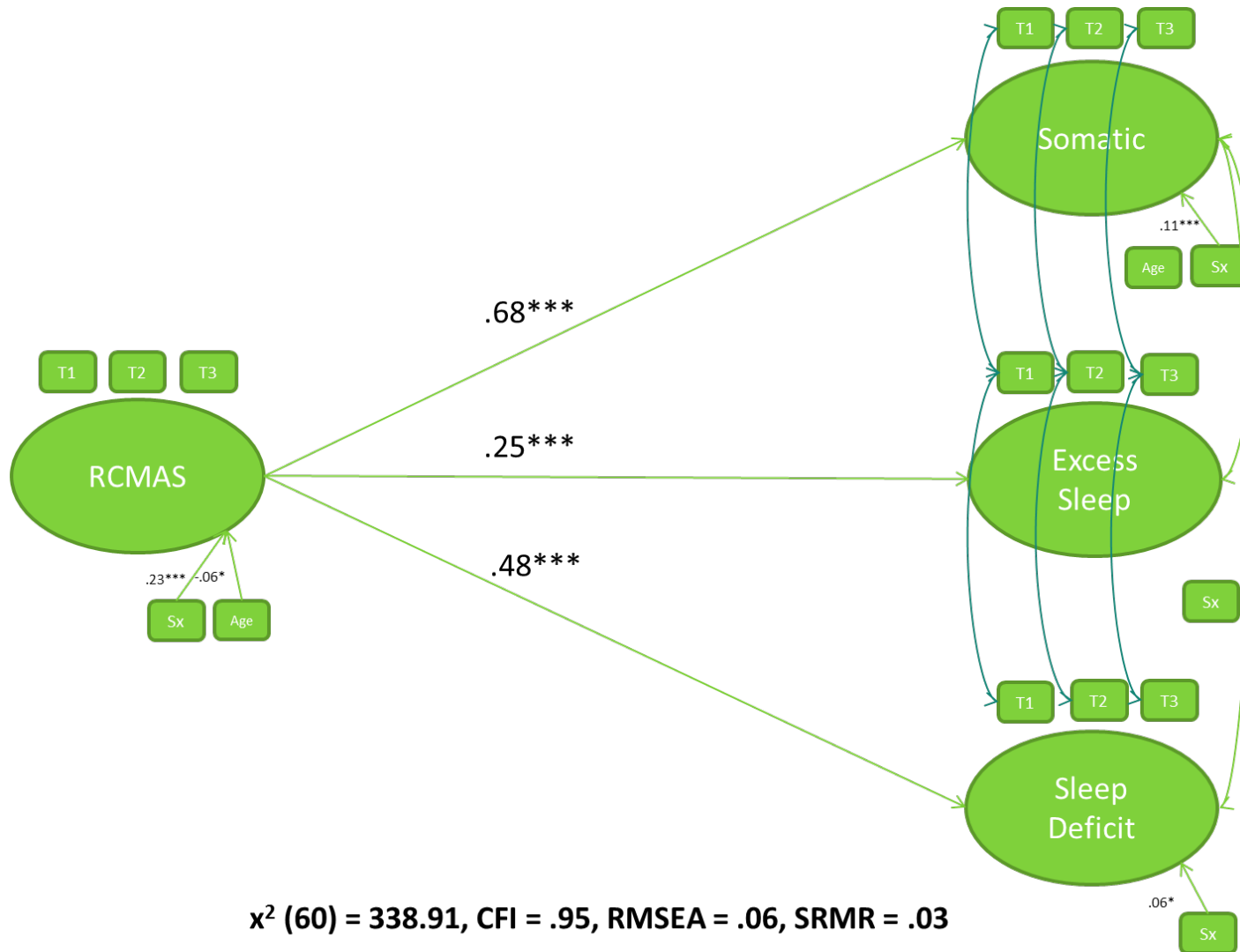


Figure 9. Structural Model: Peer Victimization and General Anxiety Symptoms Predicting Physical Health Problems

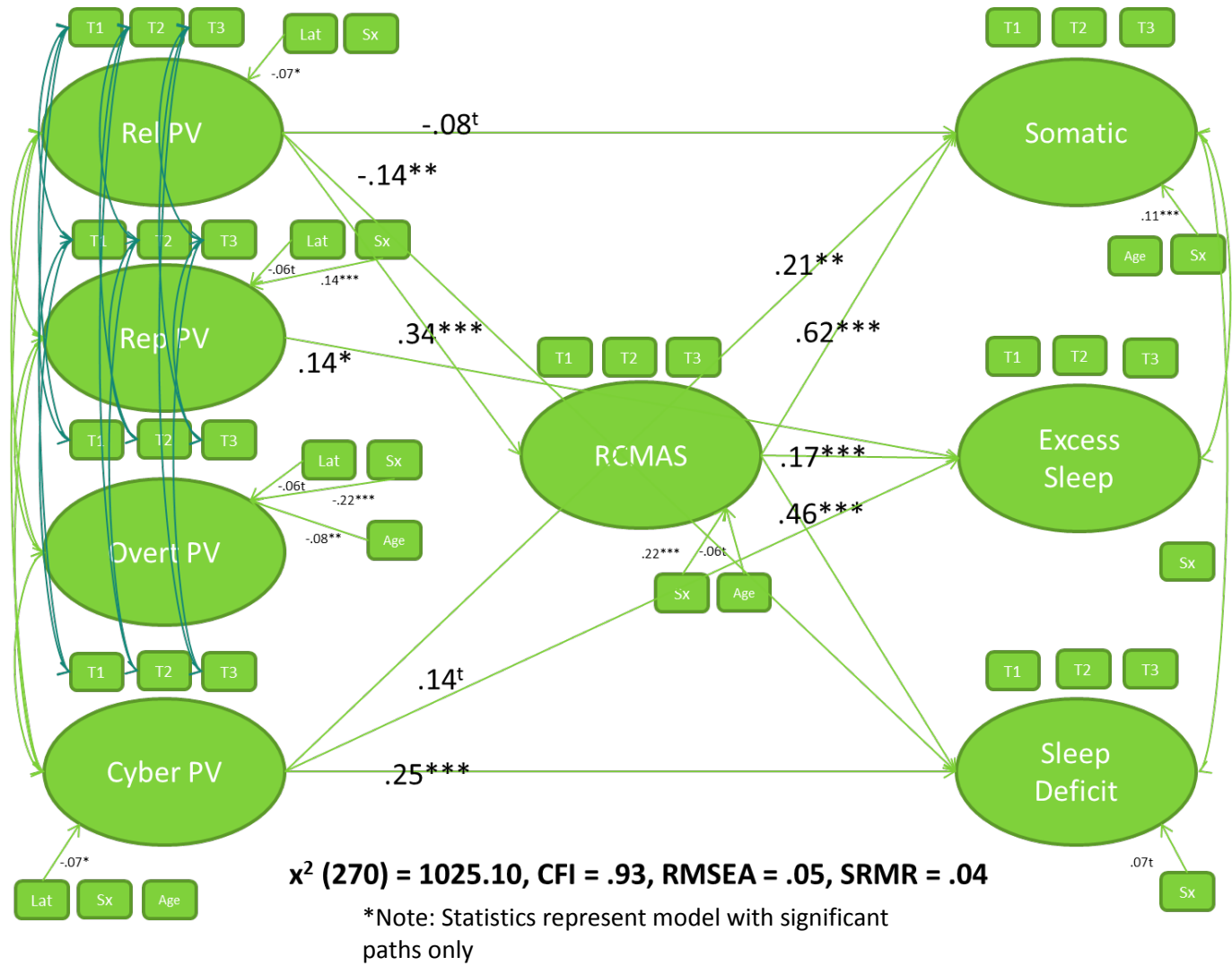
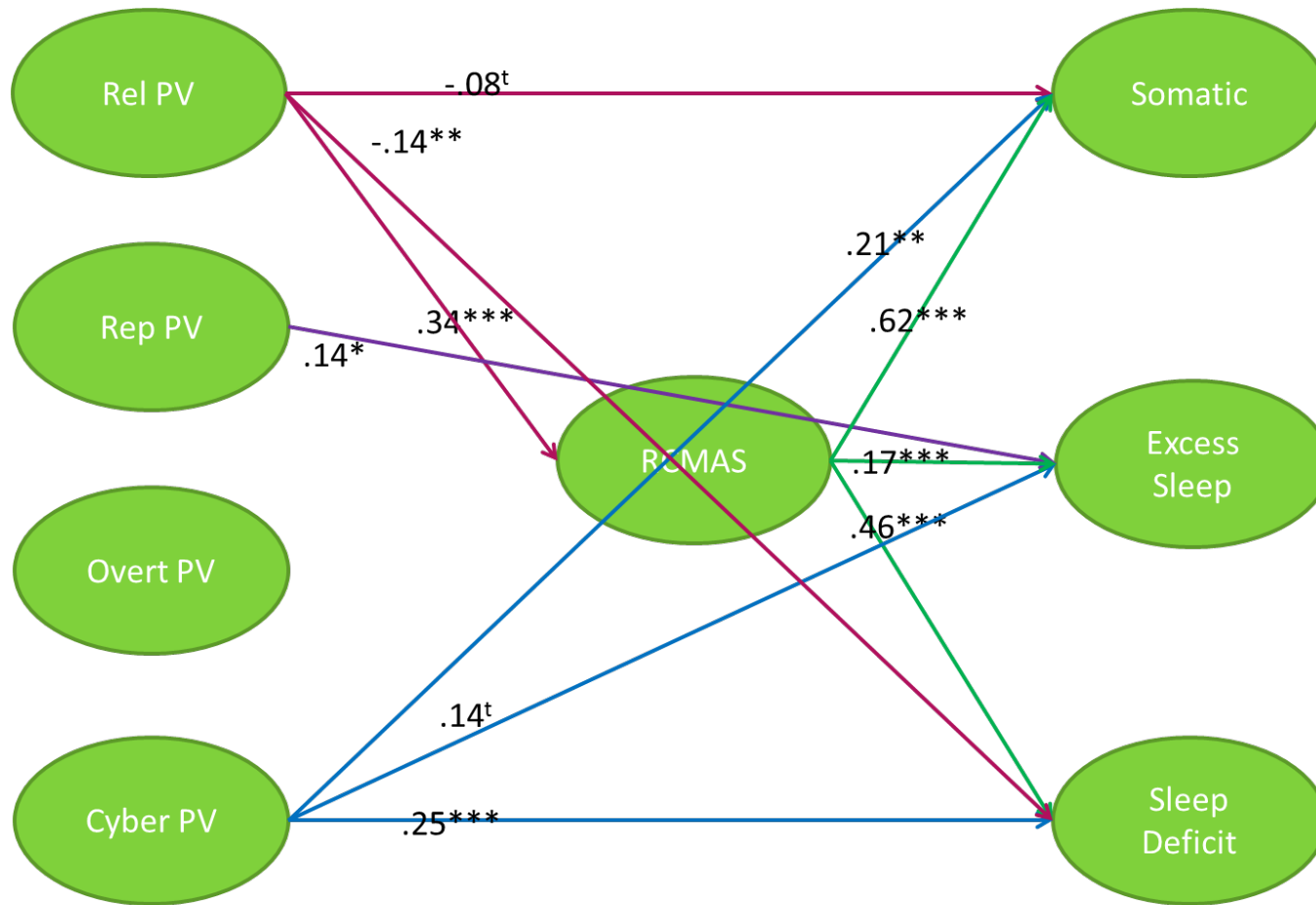


Figure 10. Reduced Structural Model: Peer Victimization and General Anxiety Symptoms Predicting Physical Health Problems



$\chi^2 (270) = 1025.10, CFI = .93, RMSEA = .05, SRMR = .04$

*Note: Statistics represent model with significant paths only

Appendix A: Demographic Variables

1. Sex Boy (Male) Girl (Female)
2. Grade 9 10 11 12
3. Date of Birth (Month/Day/Year) / / Age:
- 4a. Are you of Hispanic/Latino descent? Yes No
- 4b. Are you of Caribbean descent? Yes No
- 4c. What is your racial background? Check the one that BEST fits your background.
 White Black Asian
5. From the above descriptions (questions 4a-4c), which race/ethnicity do you identify with the most?

6. What language did you FIRST speak as a child? (circle)
English Spanish Other (explain) _____
7. Who do you currently live with?
 Mom only
 Dad only
 Both parents
 Mom and her significant other (e.g. step-parent)
 Dad and his significant other (e.g. step-parent)
 Other relatives
 Other (explain) _____
8. How many brothers and sisters do you live with at home? _____

Appendix B: R-PEQ

These questions ask about some things that often happen between teens. Please rate how often you have done these things to others and how often these things have happened to you in the past two months.

How often has this happened to you?

How often have you done this to another teen?

1. Some teens left me out of an activity or conversation conversation that I really wanted to be included in.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I left another teen out of an activity or that they really wanted to be included in.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

2. A teen chased me like he or she was really trying hurt to hurt me.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I chased a teen like I was really trying to him or her.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

3. A teen helped me when I was having a problem.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I helped a teen when they were having a problem.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

4. A teen I wanted to be with would not sit near wanted to me at lunch or in class.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I would not sit near another teen who be with me at lunch or in class.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

5. A teen tried to damage my social reputation by reputation by spreading rumors about me.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I tried to damage another teen's social spreading rumors about them.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

6. A teen was nice and friendly to me when I needed help.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I was nice and friendly to a teen when they help.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

7. A teen did not invite me to a party or social event even though they knew that I wanted to go.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
8. A teen left me out of what they were doing.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
9. To get back at me, a teen told me that s/he would not be friends with me anymore.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
10. A teen stuck up for me when I was being on picked on or excluded.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
11. A teen gossiped about me so others would not like me.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
12. A teen threatened to hurt or beat me up.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
13. A teen gave me the silent treatment (did not talk to me on purpose).
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
- I did not invite a teen to a party or other though I knew the teen wanted to go.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
- I left another teen out of what I was doing.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
- I told a teen that I would not be friends with them anymore to get back at them.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
- I stuck up for a teen who was being picked or excluded.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
- I gossiped about a teen so others would not like him/her.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
- I threatened to hurt or beat up a teen.
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week
- I gave a teen the silent treatment (did not talk to the teen on purpose).
 a. Never
 b. Once or twice
 c. A few times
 d. About once a week
 e. A few times a week

14. A teen said mean things about me so that people would think I was a loser.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I said mean things about a teen so that s/he would think I was a loser.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

15. A teen helped me join into a group or conversation.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I helped a teen join into a group or conversation.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

16. A teen hit, kicked, or pushed me in a mean way.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I hit, kicked, or pushed a teen in a mean way.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

17. A teen teased me in a mean way, by saying rude things or calling him or her bad names.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I teased a teen in a mean way, by saying rude things or calling me bad names.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

18. A teen spent time with me when I had no one else to hang out with.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

I spent time with a teen when they had no one else to hang out with.

- a. Never
- b. Once or twice
- c. A few times
- d. About once a week
- e. A few times a week

Appendix C: C-PEQ

Using this scale, **rate how often these peer experiences have happened to you. Then also circle whether or not you have done these things to another peer.**

For each item, “electronic media” refers to any internet site, Social Networking Site (SNS), text messaging, email, instant messaging and picture messaging accessed via a computer, cell phone or other mobile device.

In the past two months...	Never	Once or twice	A few times	About once a week	A few times a week	Did you do this to another peer?	
						Yes	No
1. A peer I wanted to be friends with via electronic media ignored my friend request.	1	2	3	4	5	Yes	No
2. A peer removed me from his/her list of friends via electronic media.	1	2	3	4	5	Yes	No
3. A peer made me feel bad by not listing me in his/her “Top 8” or “Top Friends” list.	1	2	3	4	5	Yes	No
4. A peer that I liked became my “friend” via electronic media.	1	2	3	4	5	Yes	No
5. A peer posted mean things about me publicly via electronic media.	1	2	3	4	5	Yes	No
6. A peer posted mean things about me anonymously via electronic media.	1	2	3	4	5	Yes	No
7. A peer posted pictures of me that made me look bad via electronic media.	1	2	3	4	5	Yes	No
8. A peer sent embarrassing pictures or videos of me to others via electronic media.	1	2	3	4	5	Yes	No
9. A peer tried to get me in trouble with parents, teachers or others by posting pictures or comments about me via electronic media.	1	2	3	4	5	Yes	No
10. A peer sent me a nice message via electronic media.	1	2	3	4	5	Yes	No
11. A peer publicly spread rumors about me or revealed secrets I had told them via electronic media.	1	2	3	4	5	Yes	No
12. A peer sent me a mean message via electronic media.	1	2	3	4	5	Yes	No
13. A peer pretended to be me via electronic media and did things to make me look bad/damage my friendships.	1	2	3	4	5	Yes	No
14. A peer prevented me from joining a group via electronic media that I really wanted to join.	1	2	3	4	5	Yes	No
15. A peer posted pictures of me having fun and spending time with them via electronic media.	1	2	3	4	5	Yes	No
16. A peer created a group via electronic media to be mean and hurt my feelings.	1	2	3	4	5	Yes	No
17. I found out that I was excluded from a party or social event via electronic media.	1	2	3	4	5	Yes	No
18. A peer I was dating broke up with me using electronic media.	1	2	3	4	5	Yes	No
19. A peer made me feel jealous by “messing” with my girlfriend/boyfriend via electronic media.	1	2	3	4	5	Yes	No
20. A peer complimented me publicly via electronic media.	1	2	3	4	5	Yes	No

Appendix D: RCMAS-2 SF-TOT

Short Version

Directions: The sentences on this form tell how some people think and feel about themselves. Read each sentence carefully, then circle the word that shows your answer and best fits your experiences over the **past two months**.

Circle *Yes* if you think the sentence is *true* about you. Circle *No* if you think it is *not true* about you. Give an answer for every sentence, even if it is hard to choose one that fits you.

There are no right or wrong answers. Only you can tell us how you think and feel about yourself and your experiences over the **past two months**.

1. Often I feel sick in my stomach.	YES	NO
2. I am nervous.	YES	NO
3. I often worry about something bad happening to me.	YES	NO
4. I fear other kids will laugh at me in class.	YES	NO
5. I have too many headaches.	YES	NO
6. I worry that others do not like me.	YES	NO
7. I wake up scared sometimes.	YES	NO
8. I get nervous around people.	YES	NO
9. I feel someone will tell me I do things the wrong way.	YES	NO
10. I fear other people will laugh at me.	YES	NO

Appendix E: YSR-Somatic and Sleep Items

Below is a list of items that describe kids.

For each item, choose the option that describes how you felt over the **last 30 days**.

FOR ALL QUESTIONS, INDICATE:

0 = Not True

1 = Somewhat/Sometimes True

2 = Very True or Often True

	Not True	Somewhat/ Sometimes True	Very True or Often True
1. I feel dizzy or lightheaded.	0	1	2
2. I feel overtired without good reason.	0	1	2
3. Physical problems without known medical cause:			
a. Aches or pains (not stomach or headaches)	0	1	2
b. Headaches	0	1	2
c. Nausea, feel sick	0	1	2
d. Problems with eyes (NOT if corrected by glasses) (describe): _____	0	1	2
e. Rashes or other skin problems	0	1	2
f. Stomachaches	0	1	2
g. Vomiting, throwing up	0	1	2
4. I have a hard time falling asleep.	0	1	2
5. I have trouble staying asleep.	0	1	2
6. I sleep more than usual.	0	1	2