

# Adaptation and Psychometric Evaluation of the Young Diagnostic Questionnaire (YDQ) for Parental Assessment of Adolescent Problematic Internet Use

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*Background and aims:* The surge of problematic Internet use in adolescents is a continuously growing problem across the globe. To our knowledge, to date valid questionnaire-based measurement of problematic Internet use is possible only by self-assessment. The objective for the present study was to adapt an established instrument for a parental assessment of adolescent problematic Internet use and to evaluate the psychometric properties of this questionnaire. *Methods:* Data were collected from a representative German sample of 1,000 parents of adolescents aged between 12 and 17 years using a standardized questionnaire. To assess problematic Internet use, we adapted the established Young Diagnostic Questionnaire by rewording the items to survey a parental rating instead of a self-report (“Parental version of the Young Diagnostic Questionnaire,” PYDQ). Additionally, we assessed the Internet usage time, parental monitoring, family functioning, school performance of the adolescent, and parent–adolescent conflicts. We conducted a confirmatory factor analysis based on the 8 items of the PYDQ modeled as categorical indicators and one latent factor using a robust weighted least squares estimator. We also calculated a reliability coefficient, the acceptance of the instrument, and performed correlation analyses. *Results:* The unidimensional model showed excellent global goodness-of-fit ( $\chi^2/df = 1.65$ , RMSEA = 0.03, CFI = 0.99, TLI = 0.99) and satisfactory factor loadings (standardized values ranged from 0.60 to 0.77). We observed a reliability coefficient of 0.70, a good acceptance of the instrument, and the correlation analyses indicated the construct validity of the PYDQ. *Discussion and conclusion:* The proposed PYDQ is a suitable instrument for parental assessment of adolescent problematic Internet use.

**Keywords:** problematic Internet use, Internet gaming disorder, questionnaire, validation, adolescent, parent

## INTRODUCTION

### *Assessment of problematic Internet use*

During the last several years, the surge of problematic Internet use [also known as Internet addiction (e.g., Van Rooij & Prause, 2014), pathological Internet use (e.g., Durkee et al., 2012), or compulsive Internet use (e.g., Quinones & Kakabadse, 2015)] in adolescents is a growing problem across the globe (e.g., Wang et al., 2013). Validated assessment instruments are required to perform empirical investigations in order to gain a better understanding of this rather new phenomenon (Chang & Law, 2008). Some measures demonstrated promising psychometric properties, but most of the existing scales for problematic Internet use require further investigations (Laconi, Rodgers, & Chabrol, 2014). To our knowledge, to date only questionnaires for the self-assessment of problematic Internet use have been published. In addition to self-reports external ratings of problematic Internet use by caregivers or relatives could be useful, like it is common in the assessment of psychological well-being of children and adolescents [e.g., the frequently used Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997) can be applied to adolescents, their parents, and teachers].

The most frequently used self-report instruments to assess problematic Internet use include the Internet

Addiction Test (IAT, Young, 1998a; consisting of 20 items), the Chen Internet Addiction Scale (CIAS, Chen, Weng, Su, Wu, & Yang, 2003; 26 items), the Young Diagnostic Questionnaire (YDQ, Young, 1998b; 8 items), and the Compulsive Internet Use Scale (CIUS, Meerkerk, van den Eijnden, Vermulst, & Garretsen, 2009; 14 items). According to Laconi et al. (2014), most often a two-factor solution for the IAT and a five-factor structure for the CIAS were reported, whereas a unidimensional structure for the YDQ and the CIUS was observed. Thus, the YDQ is one of the most widely utilized unidimensional instruments of problematic Internet use.

### *Adaption of a self-report instrument*

The objective for the present study was to develop and to evaluate an instrument for a parental assessment of adolescent problematic Internet use. The YDQ as a brief, established, and unidimensional measure appeared to be suitable for an adaptation. To our knowledge, the proposed

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Parental version of the Young Diagnostic Questionnaire (PYDQ) is the first standardized instrument to assess adolescent problematic Internet use from the parent's point of view.

#### *Characteristics and psychometric properties of the YDQ self-report version*

The YDQ is a very brief questionnaire with a binary response format ("yes" vs. "no"). The instrument has been translated into multiple languages and is used by researchers worldwide (Alavi, Maracy, Jannatifard, & Eslami, 2011; Bakken, Wenzel, Gotestam, Johansson, & Øren, 2009; Cao & Su, 2006; Cao, Su, Liu, & Gao, 2007; Chou & Hsiao, 2000; Dowling & Quirk, 2009; Durkee et al., 2012; Fischer et al., 2012; Fisoun et al., 2012; Frangos, Frangos, & Kiohos, 2010; Huang et al., 2009; Johansson & Götestam, 2004; Kesici & Sahin, 2010; Li, Zhang, Lu, Zhang, & Wang, 2014; Osada, 2013; Siomos et al., 2013; Stavropoulos, Alexandraki, & Motti-Stefanidi, 2013; Strittmatter et al., 2014, 2015; Yang & Tung, 2007; Young, 1998b; Zhou, Yuan, & Yao, 2012). The 8 items of the YDQ are based on the criteria for pathological gambling in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association, 1994).

Five published studies have evaluated the factor structure of the YDQ. In all five surveys (Frangos et al., 2010; Johansson & Götestam, 2004; Li et al., 2014; Siomos, Dafouli, Braimiotis, Mouzas, & Angelopoulos, 2008; Stavropoulos et al., 2013) an exploratory factor analysis was conducted. For the Greek version of the YDQ, two authors (Frangos et al., 2010; Stavropoulos et al., 2013) described a two-factor structure. Still, most of the investigations (Johansson & Götestam, 2004; Li et al., 2014; Siomos et al., 2008) reported a single factor solution for three different translations (Chinese, Greek, and Norwegian) of the YDQ. Reliability coefficients (internal consistency) of the respective YDQ translations ranged from 0.68 (Stavropoulos et al., 2013) to 0.79 (Fisoun et al., 2012). Correlations between the YDQ sum score and external criteria (to verify construct validity) were rarely reported. For example, Johansson and Götestam (2004) observed a statistically significant correlation ( $r = 0.28$ ,  $p < .01$ ) between the YDQ and the frequency of Internet use (number of hours per week) in a sample of Norwegian adolescents.

To summarize, the established self-report version (YDQ) has a unidimensional structure, showed acceptable reliability, and the few published correlations with external criteria indicate construct validity of this assessment instrument. We assumed that for a parental assessment of problematic Internet based on the YDQ (PYDQ), comparable psychometric properties as reported for the self-report version could be attainable.

#### *Aim and research questions of the study*

The aim of the present study was to investigate the psychometric properties of the proposed PYDQ in a representative general population sample of German parents.

We explored the following three research questions:

1. Can the unidimensional structure of the YDQ be supported for the PYDQ by confirmatory factor analysis (CFA)?
2. How reliable is the PYDQ?
3. Can construct validity be supported by associations between the PYDQ score and alternative criteria of problematic Internet use (e.g., Internet usage time per week of the adolescent)?

## METHODS

### *Procedure*

Data were collected from a representative German general population sample of 1,000 parents of adolescents aged between 12 and 17 years using a standardized questionnaire. The data collection was carried out by an experienced market research institute. Computer assisted telephone interviews with the parents were conducted in July and August 2015. For inclusion, parents had to live in a household with an adolescent aged between 12 and 17 years. If more than one adolescent in this age range lived in the same household together with his or her parent, the survey was only conducted for the child having his or her birthday more recently (pseudo-random sampling within the adolescents).

### *Measures*

Problematic Internet use in adolescents from a parent's point of view was measured using the PYDQ. No changes in content of the instrument were made, but all 8 items of the original YDQ (Young, 1998b) were reworded (changes in grammar) to gather an external instead of a self-report rating (see Table 1 for exact formulation of the items of the PYDQ). For example, the third YDQ item of Young (1998b) reads "Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?" whereas the PYDQ asks "Has your child repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?" The binary response format of the YDQ (0 = "no," 1 = "yes") was maintained for the PYDQ. The criteria of problematic Internet use assessed by the YDQ and the PYDQ are: "preoccupation" (item 1), "tolerance" (item 2), "loss of control" (items 3 and 5), "withdrawal" (item 4), "risk/lose relationships/opportunities" (item 6), "lies to conceal extent of involvement" (item 7), and "dysfunctional coping" (item 8) (Strittmatter et al., 2014). By summing up the values of all 8 items of the instrument, a PYDQ sum score was calculated with a higher sum indicating higher risk levels of adolescent problematic Internet use.

The Family APGAR (Smilkstein, 1978) was applied to measure functioning of the family. APGAR is an acronym for the five domains of family functioning (Adaptability, Partnership, Growth, Affection, and Resolve) being assessed by the standardized questionnaire. The instrument consists of 5 items (3-point scale: 0 = "hardly ever," 1 = "some of the time," 2 = "almost always"). The Family APGAR is scored by summing the values of the items for a total score (range: 0–10). A higher total score indicates a greater degree of satisfaction with self-perceived family functioning.

Table 1. Items, response distributions, and standardized factor loadings for the Parental version of the Young Diagnostic Questionnaire (PYDQ) in a representative sample of parents of adolescents aged 12–17 years (*n* = 964)

Item	Item description	Relative response frequencies (%)		Standardized factor loadings
		No	Yes	
Item 1	Does your child feel preoccupied with the Internet (think about previous online activity or anticipate next online session)?	80.6	19.4	0.61
Item 2	Does your child feel the need to use the Internet with increasing amounts of time in order to achieve satisfaction?	87.9	12.1	0.77
Item 3	Has your child repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?	89.5	10.5	0.60
Item 4	Does your child feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?	77.1	22.9	0.75
Item 5	Does your child stay online longer than originally intended?	49.8	50.2	0.65
Item 6	Has your child jeopardized or risked the loss of a significant relationship, job, educational, or career opportunity because of the Internet?	92.4	7.6	0.67
Item 7	Has your child lied to family members, a therapist, or others to conceal the extent of involvement with the Internet?	84.3	15.7	0.66
Item 8	Does your child use the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)?	87.6	12.4	0.65

Additionally, parents were requested to specify the average hours per day (separately assessed for Monday to Friday and Saturday and Sunday) their child used the Internet. Based on these values an average adolescent Internet usage time per week was calculated. Furthermore, the parents were asked to rate their monitoring of adolescents' Internet use (1 = "strongly agree," 2 = "tend to agree," 3 = "tend to disagree," 4 = "strongly disagree"; a lower rating indicates a higher monitoring of adolescent Internet use). The parents were also requested to rate how the school performance of the adolescent has developed due to his or her Internet use with a 5-level response format (1 = "strongly worsened," 2 = "worsened," 3 = "remained unchanged," 4 = "improved," 5 = "strongly improved"). Furthermore, parents were asked how often (1 = "never," 2 = "seldom," 3 = "sometimes," 4 = "often," 5 = "very often") they had conflicts with the adolescent concerning his or her Internet use. Demographic data (e.g., age and gender) were also collected.

*Participants*

The representative sample included 1,000 parents in Germany with an adolescent aged between 12 and 17 years. The sample consisted of 567 mothers (56.7%) and 433 fathers (43.3%). The mean age of adolescents was 14.21 (*SD* = 1.61, range: 12–17) and of the parents was 47.08 (*SD* = 6.32, range: 31–75) years. Eighty-eight percent of the interviewed parents lived with a partner in a household. In total, 41% of the parents had achieved "Abitur" (high educational level), 38% had achieved "Realschulabschluss" (medium educational level), and 20% had achieved "Hauptschulabschluss" or left school without qualification (low educational level). Overall, 86% of the sample was employed.

*Statistical analysis*

After excluding 36 of the 1,000 cases (3.6% of the whole sample), who did not provide a valid response to any of the

PYDQ items, statistical analyses were performed on 964 cases. CFA was conducted with categorical factor indicators using a robust (mean- and variance-adjusted) weighted least squares estimator in Mplus 7.2 (Muthén & Muthén, 2012). This approach for dichotomous and ordered categorical variables was presented in detail by Muthén (1984). According to published findings for the YDQ (Johansson & Götestam, 2004; Li et al., 2014; Siomos et al., 2008), we postulated unidimensional structure with the 8 items of the PYDQ loading on a single latent factor. The  $\chi^2$  test of model fit, the normed  $\chi^2$  index, the root mean square error of approximation (RMSEA), the weighted root mean square residual (WRMR), the Comparative Fit Index (CFI), and the Tucker–Lewis Index (TLI) were used to assess the global goodness-of-fit of the model. Additionally, as local parameters of model fit standardized factor loadings were explored. We used SPSS version 22.0 (IBM, 2013, New York, USA) to calculate the Kuder–Richardson coefficient of reliability (K-R 20, measurement of internal consistency), the completion rate for each item (measure of acceptance), an unpaired *t*-test, and Pearson's product–moment correlations between the PYDQ sum score and other criteria (related to problematic Internet use).

*Ethics*

The study procedures were carried out in accordance with the Declaration of Helsinki. All subjects of our general population sample of adults were informed about the study and all provided informed consent.

RESULTS

*Descriptive statistics for the PYDQ*

The response rates for the 8 items ranged between 93.2% (item 1 of the PYDQ) and 96.2% (item 3) indicating good

acceptance of the instrument by the parents. The average PYDQ sum score in the sample of the present study was 1.46 ( $SD = 1.66$ , range: 0–8). We did not observe a statistically significant difference ( $t = -0.20$ ,  $df = 863$ ,  $p = .844$ ) in the PYDQ sum score between the ratings of mothers ( $M = 1.45$ ,  $SD = 1.69$ ) and fathers ( $M = 1.48$ ,  $SD = 1.63$ ).

#### *Factorial validity of the PYDQ*

Response distributions and standardized factor loadings of the PYDQ items are presented in Table 1. The standardized factor loadings varied between 0.60 (item 3) and 0.77 (item 2). The normed  $\chi^2$  index ( $\chi^2/df$ ) was 1.65 ( $\chi^2 = 29.75$ ,  $df = 18$ ,  $p = .040$ ), fulfilling the recommended threshold for categorical data of falling below two or three (Schreiber, Stage, King, Nora, & Barlow, 2006, p. 330). The values for the RMSEA (0.03), the WRMR (0.78), the CFI (0.99), and the TLI (0.99) clearly reached the cut-off values for good model fit recommended by Schreiber et al. (2006) (RMSEA < 0.06, WRMR < 0.90, CFI > 0.95, and TLI > 0.96). Considering these results, unidimensionality of the PYDQ was strongly supported.

#### *Reliability and construct validity of the PYDQ*

According to Kuder–Richardson 20 formula for binary items, reliability of the PYDQ was 0.70 in our sample. There was no improvement in internal consistency with deletion of any item (range: 0.65–0.68). Statistically significant Pearson's product–moment correlations between the PYDQ sum score and the average adolescent Internet usage time per week ( $r = 0.31$ ,  $p < .001$ ), parental monitoring of adolescent Internet use ( $r = 0.21$ ,  $p < .001$ ), family functioning ( $r = -0.36$ ,  $p < .001$ ), the development of school performance of the adolescent due to his or her Internet use ( $r = -0.32$ ,  $p < .001$ ), and the frequency of conflicts with the adolescent concerning his or her Internet use ( $r = 0.60$ ,  $p < .001$ ) are the first indications for the construct validity of the PYDQ.

## DISCUSSION

In the present survey, the psychometric properties of a PYDQ were assessed in a representative sample of 1,000 parents with adolescents aged 12–17 years in Germany. To our knowledge, the suggested PYDQ is the first standardized instrument to assess problematic Internet use of adolescents from a parent's point of view.

Our goal was to develop an efficient and unidimensional assessment instrument. For this purpose, we adapted the established YDQ (Young, 1998b). Most of the published results (Johansson & Götestam, 2004; Li et al., 2014; Siomos et al., 2008) indicate a one-factor structure for the YDQ. Results from the CFA of the PYDQ support these findings. Except for one value (statistically significant  $\chi^2$  test of model fit), we found good values for all other global fit indices (RMSEA, WRMR, CFI, TLI, and  $\chi^2/df$ ) and local parameters of model fit. A unidimensional model for the PYDQ seems to fit the data very well.

We observed a reliability of 0.70 for the PYDQ, which is in the range of the published reliability coefficients for the self-assessment version of the YDQ (0.68–0.79). Aiken and Groth-Marnat (2006) suggest that a questionnaire with a reliability coefficient above 0.60 is sufficiently appropriate for the examination of groups, and this criterion was met by the PYDQ. Furthermore, we observed high response rates (above 90% for every item) indicating a good acceptance of the PYDQ in our sample of parents.

Based on adolescent self-reports in several studies associations between problematic Internet use and a higher average Internet usage time (e.g., Johansson & Götestam, 2004), a lower parental monitoring (e.g., Yen, Ko, Yen, Chang, & Cheng, 2009), a lower functioning of the family (e.g., Ko, Yen, Yen, Lin, & Yang, 2007), a lower school performance (e.g., Stavropoulos et al., 2013), and a higher frequency of familial conflicts (e.g., Wartberg, Kriston, Kammerl, Petersen, & Thomasius, 2015) were reported. Johansson and Götestam (2004) observed in a sample of Norwegian adolescents a correlation of 0.28 between the YDQ sum score and the average Internet usage time per week. In the present study, we found a correlation in a comparable size (0.31) between the PYDQ sum score and the parental estimation of the weekly Internet usage time of his or her adolescent (indicating a moderate but statistically significant association between problematic Internet use and a longer duration of adolescent Internet use). Furthermore, we found a statistically significant relation between a higher PYDQ value and a lower parental monitoring. This finding is in accordance with the result of Yen et al. (2009), indicating that less parental monitoring promotes adolescent problematic Internet use.

In some cross-sectional surveys (e.g., Ko et al., 2007), lower family functioning was associated with adolescent problematic Internet use. To our knowledge, the available findings had been solely based on adolescent self-reports. Our study confirmed the association between lower family functioning and problematic Internet use in parent-reports. Following Ko et al. (2007), the observed problematic Internet use in adolescents can be interpreted as an attempt to compensate familial problems (e.g., if certain needs of the adolescent are not fulfilled due to a low functioning in the family).

It is further conceivable that a very intense use of the Internet and the related neglect of other activities may lead to less commitment in school and fewer contacts or more arguments in the family. In our study, we observed an association between a higher PYDQ value and a change for the worse in the school achievement of the adolescent caused by his or her Internet use. This finding is in line with the result of Stavropoulos et al. (2013), whereupon problematic Internet use (measured by the self-report version of the YDQ) is related to worse academic achievement in adolescents. However, in the present survey the school achievement was based on subjective parental ratings, whereas Stavropoulos et al. (2013) used a more objective measure (student's grade point average based on assessments of several different teachers for every adolescent). Furthermore, we found a statistically significant relation between a higher PYDQ value and more frequent parent–adolescent conflicts concerning the adolescent Internet use.

This result is in line with several studies (e.g., [Wartberg et al., 2015](#)), describing a higher frequency of conflicts between parents and their children reporting problematic Internet use as opposed to control families.

We hold the view that an assessment of the PYDQ items by the caregiver is possible and meaningful, if the parent and the adolescent live together in the same household. We did not find a statistically significant difference in the PYDQ sum scores comparing mothers and fathers. Therefore, it seems to be possible to use the rating of a female or a male caregiver to assess adolescent problematic Internet use from a parent's point of view.

Concerning other aspects of mental health in youth (e.g., internalizing and externalizing problems), it is quite a common procedure to assess the parental perspective in addition to adolescent ratings with adapted screening instruments (e.g., the SDQ, [Goodman, 1997](#)), and to compare these two perspectives. Combining external with self-reported ratings seems to be a promising approach for a deeper understanding of problematic Internet use or the new DSM-5 diagnosis "Internet gaming disorder" ([American Psychiatric Association, 2013](#)). In a next step, empirically validated norm values for the PYDQ should be established.

Noteworthy, [Vadlin, Åslund, Rehn, and Nilsson \(2015\)](#) had recently presented a new measure for video game addiction (gaming addiction identification test, GAIT) in a self-report and a parent version. The evaluated version of the GAIT assesses 7 out of 9 criteria of Internet gaming disorder ([Vadlin et al., 2015](#)) and the authors reported a high concordance between the ratings of the parents and the adolescents. On the one hand there are differences between the nosological entities of problematic Internet use and problematic online gaming ([Király et al., 2014](#)) or Internet gaming disorder ([Griffiths & Pontes, 2014](#)), but on the other hand the findings of [Vadlin et al. \(2015\)](#) could be interpreted as indications that the ratings of parents could be important for the assessment of adolescent problematic Internet use.

The present study has several limitations. The PYDQ assesses problematic Internet use of adolescents from a parent's point of view and was applied in a sample of parents. To verify the construct validity, a comparison with the ratings of adolescents would have been of great value, but we were unable to realize this dyadic approach in our survey. In general, the approach to assess adolescent problematic Internet use by a parent requires further empirical investigation. It cannot be excluded that other (not media-related) familial aspects or interactions (e.g., overprotective parenting style) influence parental response behavior in the PYDQ. It is conceivable that some PYDQ items considering observable behavior (e.g., "Has your child lied to family members, a therapist, or others to conceal the extent of involvement with the Internet?") are easier to rate for parents than other questions regarding thoughts and feelings of the adolescent, like "Does your child feel preoccupied with the Internet (think about previous online activity or anticipate next online session)?" Compared to the other questions of the PYDQ item 5 seems to distinguish worse between problematic and unproblematic Internet use. But to ensure comparability between the self-reported YDQ and the ratings of the parents in the PYDQ, currently a change of the wording of this item seems not useful. Furthermore, it

cannot be ruled out that with increasing age of the adolescent a parental rating of his or her problematic Internet use would become more difficult and less accurate. This was the first investigation using the PYDQ, but the psychometric properties should necessarily be tested in other samples. Concerning the self-report version of the instrument (YDQ), some contradictory findings were reported. For example, in most studies a single factor solution (e.g., [Li et al., 2014](#)) was reported, but two studies described a two-factor structure ([Frangos et al., 2010](#); [Stavropoulos et al., 2013](#)) of the YDQ.

Despite the listed limitations, the PYDQ could be an interesting alternative to the established self-report instruments (e.g., IAT, CIAS, YDQ, and CIUS). According to our experience in the treatment of children and adolescents showing problematic Internet use, the first contact or even the first visit in the treatment facility is often made by parents. A validated and standardized measure to assess adolescent problematic Internet use from a parent's point of view could provide important notes for the planning of future interventions.

In summary, in the present study we found in the psychometric evaluation of the new measure PYDQ a good evidence of a unidimensional structure, a good acceptance, a sufficient reliability for the examination of groups, and reasonable correlations indicating construct validity of the suggested screening instrument. Accordingly, the PYDQ seems suitable to assess problematic Internet use in adolescents from the parent's point of view.

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*Authors' contribution:* LW designed the study. LW and LK performed the statistical analysis. LW wrote the first draft of the manuscript. KK, RT, and LK revised the article critically. All authors reviewed the manuscript for intellectual content, read and approved the final version of the manuscript. All authors had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

*Conflict of interest:* The authors declare no conflict of interest.

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