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# Understanding Personality Pathology in Clinical Youth: Study Protocol for the longitudinal research project ‘APOLO’

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Understanding Personality Pathology in Clinical Youth

Study Protocol for the longitudinal research project ‘APOLO’

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Abstract

INTRODUCTION: We propose that a dimensional, multi-layered perspective is well-suited to study maladaptive personality development in adolescents. Such a perspective can help understand pathways to personality pathology and contribute to early detection. The research project ‘APOLO’ (a Dutch language acronym for Adolescents and their Personality Development: a Longitudinal Study) is designed based on McAdams’ integrative three-layered model of (mal)adaptive personality development and assesses the interaction between dispositional traits, characteristic adaptations, the narrative identity and functioning.

METHODS AND ANALYSIS: APOLO is a longitudinal research project that takes place in two outpatient mental health care centres. Participants are adolescents between 12-23 years and their parents. Data collection is set up to build a data set for research, as well as to use the data for diagnostic assessment and systematic treatment evaluation of individual patients. Measurements are conducted half-yearly for three years and consist of self- and informant-report questionnaires and a semi-structured interview. The included constructs fit the dimensional model of personality development: maladaptive personality traits (dispositional traits), social relations, stressful life events (characteristic adaptations), a turning point (narrative identity) and functioning (e.g., achievement of youth specific milestones). Primary research questions will be analysed using structural equation modelling.

ETHICS AND DISSEMINATION: The results will contribute to our understanding of (the development of) personality pathology as a complex phenomenon in which both structural personal characteristics as well as unique individual experiences play a role. Furthermore, results will give directions for early detection and timely interventions. This study has been approved by the Ethical Review Committee of the Utrecht University Faculty for Social and Behavioural Sciences (FETC17-092). Data distribution will be anonymous and results will be disseminated via communication canals appropriate for diverse audiences, this includes both clinical and scientific conferences, papers published in national and international peer-reviewed journals and (social) media platforms.

Keywords: Personality pathology, maladaptive personality development, adolescents, clinical, study protocol, longitudinal
Article Summary

This project has a large clinical sample of adolescents and their parents

APOLO has a longitudinal multi-informant, multi-concept and multi-method design

Findings may inform both scientific as well as the clinical field

The design allows for between- and within-subjects comparisons but has no non-clinical control group

Attrition is a major challenge that is handled via clinical embedment

Introduction

Recent developments in the field of personality psychology (i.e., scientific research on personality structure) and clinical personality psychology (i.e., assessment and treatment of personality disorders) mark a gradual shift towards a dimensional and personal understanding of personality pathology. Among others this has resulted in a proposal for the Alternative Model of Personality Disorders (AMPD) in the DSM-5 and the recognition of the necessity to consider an individual’s subjective experience to understand and treat psychopathology. This is a promising perspective in the search for a valid way to understand maladaptive personality development and recognize personality pathology early in its development. Based on these recent developments we designed and set up ‘APOLO’ (Dutch language acronym for Adolescents and their Personality Development: A Longitudinal Study), a longitudinal two-site research project, along a three-layered integrative model of (maladaptive) personality development. In this study protocol we use the term personality pathology when referring to pervasive, persistent and pathological personality functioning, whereas the term personality disorder refers to a categorical DSM-5-II classification.

Personality Pathology as a dimensional, developmental and multi-faceted construct
General personality differences between individuals are often described along five trait-dimensions most of which vary from adaptive to maladaptive levels\textsuperscript{5,6,7}. Maladaptive trait dimensions are generally conceptualized as negative affectivity, detachment, antagonism, disinhibition and psychoticism. Within one person these dimensions give an approximation of one’s unique personality. From a developmental perspective, personality is shaped by both person- and environmental characteristics and the continuous interaction between these\textsuperscript{8,9}.

Personality pathology therefore does not appear overnight, but can be thought of as the result of a maladaptive personality development\textsuperscript{10}, often in interaction with environmental factors\textsuperscript{9}.

Specifically, maladaptive personality trait levels may interact with experiencing maladaptive environmental characteristics, such as negative parent-child relations (i.e., insecure attachment, harsh parenting\textsuperscript{11}), negative peer relations (i.e., bullying\textsuperscript{12}) and/or experiencing childhood trauma (i.e., neglect, sexual abuse\textsuperscript{13}). This interaction leads to a set of characteristic adaptations that in turn interact with environmental demands and tasks\textsuperscript{14}. As such, maladaptive personality development is a complex and multi-dimensional process that may lead to one outcome: pervasive, persistent and pathological problems in personality functioning, or personality pathology.

\textit{Personality pathology as a combination of multiple layers}

An integrative theoretical framework that is well-suited to study (mal)adaptive personality development is proposed by Dan McAdams\textsuperscript{15,16}. This framework has development at its core and conceptualizes personality as a dimensional construct by differentiating three interacting layers. The first layer, \textit{dispositional traits}, represents broad dimensions of individual differences, accounting for inter-individual consistency and continuity in behaviour, thought and feeling across situations over time. This layer is conceived of personality traits like the Five Factor Model that are thought of as heritable and relatively stable\textsuperscript{6,16,17}. The second layer,
characteristic adaptations, represents those aspects of human individuality that concern motivational, social-cognitive and developmental adaptations, contextualized in time, place and/or social role. In other words, the way an individual adapts in a unique way in response to the environment he or she lives in. These adaptations are thought of as less stable\textsuperscript{16,17,18}. The third layer, narrative identity, constitutes a personal story about one’s life that helps shape behaviour and establish identity. Through autobiographical reasoning a person creates a narrative of how different parts of, and change in, one’s past, present and future are related\textsuperscript{19}.

**APOLO’s objectives and relevance**

Recently, this model has been used to study personality pathology\textsuperscript{20,21,22,23}. However, studies are limited, especially in clinical groups, in both number and/or quality and mainly concern adult participants. The complete model has not been tested in longitudinal studies with (clinical) youth, while this could greatly increase our understanding of maladaptive personality development. In addition, longitudinal studies particularly could contribute to early detection of personality pathology, which is essential for improving the prognosis for these vulnerable youth\textsuperscript{24,25,26}. By studying maladaptive personality development with this model, we hope to contribute to a valid, personal and nuanced perspective on (the development of) personality pathology in adolescents, a perspective that has great clinical utility for both diagnostic assessment as well as treatment. With the APOLO project we aim to enhance our knowledge on personality pathology by examining the interplay between the three layers of personality over time, specifically focusing on maladaptive aspects of personality development. We do this by taking a multi-method, multi-informant, multi-concept and longitudinal approach\textsuperscript{27}.

**Methods and analysis**
Patient and Public Involvement Statement

The APOLO research project is a co-creation between clinicians, experts by experience and researchers. The dimensional and developmentally sensitive design was based on the need for a personal and nuanced approach to personality pathology, a construct that is often clouded by stigma and controversies, especially in adolescents. The design was discussed with adolescent experts by experience, whom were especially positive about this dimensional and personal perspective. This could help reduce the stigma of personality pathology and lay the focus on strengths and vulnerabilities, while at the same time contributing to young people getting the help they need in time. For this reason the APOLO project was designed with an explicit dual purpose: 1) to be used to conduct scientific research and 2) to inform the patients’ individual clinical trajectory. This study is part of the ‘Youthlab’ program in which researchers, clinicians and both clinical and non-clinical youth work together to innovate healthcare processes as well as disseminate results in order to reach the appropriate audience (i.e. symposia, infographics, vlogs, website).

Setting

APOLO is a longitudinal two-site research project of which the design started in 2017 and data-collection started mid 2018. APOLO is planned to run for at least five years. The research project is conducted in two mental health care institutes in the Netherlands: Reinier van Arkel and Vincent van Gogh. These outpatient facilities provide diagnosis and treatment to individuals with psychological, self- or social functioning problems and specialize in early detection and treatment of severe psychopathology, including personality disorders.

Participants
The research population of APOLO consists of adolescents between ages 12 and 24, and their parents, referred for treatment to the participating institutions with varying levels of severity and/or complexity in psychological problems. Adolescents are screened when referred to the outpatient facilities to accomplish that patients who are invited for intake in the teams in which APOLO takes place do not have an intellectual disability (IQ<85), acute psychotic disorder, severe eating disorder or severe substance dependence. All adolescents that are at the start of their treatment are asked to participate. In the rare case that an adolescent is included that does not fit the research population due to a wrong referral, he or she will be excluded from follow-up assessments and reallocated to another team or institute for suitable treatment.

Procedure

After adolescents are referred to one of the two specialized mental health care institutes and invited for intake in a team in which APOLO takes place, they – as well as their parents – receive an email with a link to fill out questionnaires online at home. This assessment is used for treatment indication as part of the diagnostic process at intake and therefore ‘care as usual’. The assessment at intake (or first ‘wave’) consists of a total of eleven self-report questionnaires for adolescents (duration 45-60 min.) and a total of six questionnaires for one of the parents (duration 15 min.). Adolescents and parents have access to the questionnaires three weeks prior to and after their intake appointment. Failing to fill out the questionnaires within this period results in the data for that wave being registered as missing.

Along with the invitation for their intake appointments (consisting of one appointment for intake and one for feedback and consultation, with usually three weeks in between), adolescents and their parents receive an invitation to participate in APOLO. The invitation letter contains an information folder, directions to the website and an informed consent.
form. Adolescents and parents are asked to give their written informed consent for using their data for scientific research. They are also informed that they can revoke their participation at any time without any consequences and will continue to receive treatment as usual. They are asked to bring the signed consent form to the intake. All therapists conducting intakes are informed of the background and practicalities of APOLO and are trained in conducting the semi-structured interview that is part of the assessment. During the intake, participants are again informed of the research project and given the opportunity to ask questions, informed consent is (signed and) handed in and a Turning Point Interview (approximately 5 minutes) is conducted and recorded on a tablet. Participants who have not yet filled out the questionnaires are given the opportunity to do so in a computer room at the institute.

Follow-up assessments are conducted every six months (counted from the date of intake) over a course of three years, resulting in a maximum of six waves. Participants receive the same measures (or a shortened test battery, see Appendix 1); the questionnaires online and the semi-structured interview via a face-to-face or telephone appointment. Participants have access to these questionnaires two weeks prior to and after the intended assessment date. Since dropout is a known issue in longitudinal research and even more so in a clinical setting, the research team makes a great effort in monitoring follow-up assessments and notifying participants (first by e-mail, then if needed by phone) when their next assessment is approaching. Furthermore, to ensure participation and prevent drop out, the assessments are consistently used in the clinical process: for treatment indication at intake, as a supplement to diagnostic assessments and for systematic treatment evaluation. Additionally, after each wave – whether or not they are still in treatment – participants are invited for a (free) appointment with a therapist involved with the research project in which extensive individual feedback is provided about the outcomes.
Measures

The measured variables are based on the theoretical model of personality development by McAdams, see Figure 1. Assessment differs slightly between settings, see Appendix 1.

FIGURE 1 here

Dispositional traits: PID-5

The PID-5-SF is a shortened version of the original 220-item Personality Inventory for DSM-5 (PID-5). The PID-5 is a self-report questionnaire that measures 5 higher order maladaptive trait domains: Negative Affectivity, Detachment, Antagonism, Disinhibition and Psychoticism, along 25 trait facets. The PID-5 has been translated into Dutch according to international standards under supervision by the Dutch association for psychiatry, with backwards translation by the original authors to maintain equivalence. The PID-5-SF (of which all the items are contained in the original form) measures the same 5 trait domains and 25 facets with 100 items on a 5 point Likert scale ranging from ‘completely not true’ to ‘completely true’. This version was validated for use with adults and adolescents. The 25-item PID-5-BF, also used in this study (see Appendix 1), is again a shortened version of the original questionnaire that measures the 5 trait domains with 25 items. The PID-5-BF has been shown to reliably and validly assess the DSM-5 traits in European adolescents and adults. An overview of its psychometric properties can be found in Koster and colleagues. Due to differences between the PID-5-SF and PID-5-BF, participants in some cases (see Appendix 1) receive the PID-5-SF and an additional 9 items of the PID-5-BF (items 1, 4, 5, 6, 7, 8, 16, 18 & 23) in order to cover all items. Parents receive the informant version, the PID-5-IBF.
Characteristic adaptations: RQ

The Relationship Questionnaire (RQ) is a 5-item self-report measure that consists of four paragraphs describing secure, preoccupied, fearful and dismissing attachment styles. Respondents are asked to first indicate which attachment style best describes them and second to rate the degree to which the four descriptions characterize them using a 7-point Likert scale, ranging from ‘not at all like me’ to ‘very much like me’. The RQ has been shown to have reasonable validity and stability in use with young adults and undergraduates. Results correlate moderately with attachment styles determined by interview. The RQ provides a rapid assessment of attachment quality and has been used with adolescents. The RQ was translated into Dutch by Lowyck, Luyten, Hutsebaut and Corveleyn.

Characteristic adaptations: IIP-32

The Inventory of Interpersonal Problems-32 (IIP-32) is a 32-item self-report questionnaire measuring interpersonal difficulties. The IIP-32 has satisfactory reliability and validity and has previously been reliably administered to adolescent populations. In this research project, we use the Dutch language version. All items are rated on a 5-point Likert scale ranging from ‘not at all’ to ‘extremely’. The measure yields a score on two underlying dimensions: Affiliation and Dominance, as well as scores on eight subscales: domineering/controlling, vindictive/self-centred, cold/distant, socially inhibited, non-assertive, overly accommodating, self-sacrificing and intrusive/needy.

Characteristic adaptations: NRI-BSV

The Network of Relationships Inventory – Behavioral Systems Version (NRI-BSV) is a 24-item self-report questionnaire that measures how frequently different relationships are used to fulfil the functions of three behavioural systems: attachment, caregiving and affiliation. Items
are answered on a 5-point Likert scale ranging from ‘(almost) never’ to ‘(almost) always’.

The NRI-BSV has been found to have adequate psychometric properties and excellent reliability. We use an 11-item version of the NRI-BSV with which the two broad domains Support and Negative Interactions can be constructed. The NRI-BSV was translated into Dutch by Van Aken and Hessels.

**Narrative identity: TPQ and TPI**

The Turning Point Questionnaire (TPQ) is a qualitative measure designed as an infographic (see Appendix 2 for the infographic). The TPQ is constructed as part of the theoretical framework of McAdams' life story model of identity, which posits that one's identity is demonstrated through the construction of a life story. Facets of one’s identity may be identified by analysing how individuals narrate significant life experiences like turning points. Turning points are specific events that are perceived to alter the normal flow and direction of one’s life. The TPQ asks participants if they ever experienced a life event that they might call a turning point or – if not – to pick an event that resembles a turning point. They are asked to shortly describe this event, whether they derived a lesson from this event (on a 7-point Likert scale ranging from ‘not at all’ to ‘very much’) and whether they have discussed this event with a parent/caretaker. Parents receive an informant version of the TPQ at the first wave along with the same infographic describing what a turning point is. In this informant version they are asked if they think their child has experienced a turning point and to shortly describe this event.

Subsequently, the TPQ is expanded with a short semi-structured interview that is conducted by trained clinicians and recorded, the Turning Point Interview (TPI). Participants are asked to narrate about this turning point and with three follow-up questions are asked specific details about how this event has influenced the participant. The narratives are
transcribed and coded for theme, valence, meaning making, agency, communion and coherence.

Stressful life events: CHAOS
The Confusion, Hubbub, and Order Scale (CHAOS) is a questionnaire that measures the quality of the adolescents’ home environment. The questionnaire is built on the premise that youth are better able to function in home environments with more order and less confusion and hubbub. The CHAOS has been found to have satisfactory internal consistency, test-retest stability as well as validity. The Dutch adaptation of the CHAOS used in the current research project consists of 17 items that are rated on a 5-point Likert scale ranging from ‘not at all true’ to ‘completely true’. Internal consistency of the Dutch translation of the CHAOS, as measured by Cronbach’s alpha coefficients, were >.75 for adults and >.70 for children. CHAOS scores were found to be associated with directly observed measures of environmental confusion and parental behaviours. Only participants’ parents receive this measure.

Stressful life events: LEQ
The Life Events Questionnaire (LEQ) is a self-report measure constructed out of three existing questionnaires which were combined to fit the purpose of this research project. The Life Experiences Survey (LES) was used for its structure, in which both the occurrence and the impact of specific life events is assessed. Within this structure questions of the Childhood Trauma Questionnaire (CTQ) and the Levensgebeurtenissen Vragenlijst (a Dutch life events survey) were combined. The LEQ we used in this research project consists of 12 items that cover stressful life events in the family, personal experiences and bullying, and one open item that asks the participant for any stressful event not covered by the items before. The 12 questions consist of two parts: first the adolescent is asked to indicate whether (yes or no)
he/she has experienced the event during his/her lifetime and secondly to indicate how much
(on a 4-point Likert scale ranging from +1 ‘positively’ to -3 ‘very negatively’) this event
impacted his/her life. In all follow-up waves participants are asked whether they have
experienced the events since the last wave.

**Functioning, symptoms: SQ-48 and SDQ**

Within the domain of functioning, two questionnaires are used to assess symptoms (see
Appendix 1 for details). The 48-item Symptom Questionnaire (SQ-48\(^{64}\)) is a self-report
questionnaire measuring psychological distress with 9 subdomains: depression, anxiety,
somatization, agoraphobia, aggression, cognitive problems, social phobia, work functioning,
and vitality. All items are rated on a 5-point Likert scale ranging from ‘never’ to ‘very often’.
The SQ-48 has good internal consistency as well as good convergent and divergent validity\(^{64}\).
An additional study showed that the SQ-48 has excellent test–retest reliability and good
responsiveness to therapeutic change\(^{65}\).

The Strengths and Difficulties Questionnaire (SDQ\(^{66,67}\)) is a 25-item questionnaire that
measures psychopathological symptoms in children and adolescents with 5 subdomains:
emotional symptoms, conduct problems, hyperactivity-inattention, peer relationship problems,
and prosocial behaviours. All items are rated on a 3-point Likert scale ranging from ‘not true’
to ‘certainly true’. In APOLO the Dutch translation of the SDQ is used, which was found to
have acceptable to good internal consistency for the self-report and informant versions and
good concurrent validity\(^{68,69}\).

**Functioning: DTL**

Achievement of youth-specific milestones was assessed using a newly developed measure:
The Developmental Task List (DTL\(^{70}\)). The DTL is a 28-item questionnaire including tasks
and activities reflective of youth-specific developmental tasks (i.e., milestones). The first 21
items of this list ask, on a 7-point Likert scale, to what extent the participant experiences
trouble in the achievement of youth-specific milestones in three broader domains based on
previous work on youth-specific milestones\textsuperscript{71}: social (e.g., relationships with peers), personal
(e.g., autonomy) and professional (e.g., school/work). The last 7 items of this list were
included specifically for (our) clinical populations, providing an indication, on a 4-point
Likert scale, of clinical severity that may hamper the achievement of milestones (e.g.,
problems in accepting help, auto mutilation, drug abuse). Parents receive an informant version
of the DTL.

**Functioning: LPFS-BF**

The Level of Personality Functioning Scale – Brief Form (LPFS-BF\textsuperscript{72}) was developed as an
easy-to-use tool to self-assess whether particular problems were likely related to personality
dysfunction. It is a measure of self- and interpersonal functioning, as an operationalization of
global personality functioning\textsuperscript{73}. The LPFS-BF consists of 12 questions which are clustered
into four subscales (Identity, Self-Direction, Empathy, and Intimacy). These subscales are
clustered into two higher domains, Self-Functioning and Interpersonal Functioning.

Participants respond to these questions on a 4-point Likert scale ranging from ‘not at all true
or often untrue’ to ‘often true or completely true’. Internal consistency of the Dutch
translation of the LPFS-BF, as measured by Cronbach’s alpha coefficients, were .89 for the
LPFS-BF total scale, .86 for the Self Functioning subscale, and .80 for the Interpersonal
Functioning subscale\textsuperscript{74}. Another study found again satisfactory internal consistency and
promising construct validity\textsuperscript{75}.

**Functioning: SWLS**
The Satisfaction With Life Scale (SWLS) contains five items to measure global judgments of satisfaction with one’s life. We use the Dutch translation of the SWLS. Items are scored on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). The five items are summed.

**Power Calculation and Data handling**

This project has two primary research questions: 1) What is the nature of the interplay between the three layers of maladaptive personality development in clinical youth? and 2) How is the interplay of these layers related to personality pathology? Power was considered for the primary research questions, which will be explored using Structural Equation Modelling (SEM) in MPlus and Latent Class Modeling in Latent Gold. The results of these analyses will give insight in both the interplay between the layers, how these are related to functioning, as well as whether this differs in a meaningful way between groups. Based on both simulations and rules of thumb of the power needed to analyse complex SEM models with multiple variables and missing data a sample size of >300 complete cases should be adequate. To analyse latent classes, considering the assumed class separation, effect size and complexity of the data, a sample size of >500 is suggested. In the case of data difficulties like measurement non-invariance or differential item functioning, which may be likely in a clinical data set with multiple variables, this technique is also suitable.

A cooperation was set up with the data laboratory of Utrecht University to store the data that were collected at all locations. This ensures reliable and secure data management while data-collection is ongoing.

**Ethics and dissemination**
APOLO combines a longitudinal scientific study and clinical implementation of a multi-layered dimensional model of maladaptive personality development in an outpatient clinical adolescent sample. APOLO measures several constructs according to three-layered model of personality development, taking a multi-method, multi-concept and multi-informant approach. The data collection and handling is set up in such a way that it 1) provides the opportunity to study important scientific questions concerning maladaptive personality development and 2) informs the individual clinical process, providing patients with a direct benefit of completing the measures. As such, this project is inevitably faced with challenges, of which attrition and the balance between ensuring an anonymous and scientifically sound longitudinal dataset while also making appropriate use of the data for individual clinical trajectories are the most prominent. Cooperation between the different clinical sites is a challenge that is approached flexibly to ensure clinical embedment and prevent attrition, resulting in slight differences between the number and type of instruments included. The embedding of this project in the clinical structure is therefore an essential but also unique feature on which a lot of effort and time is spent. Furthermore, recruitment of all adolescents referred to the involved institutes reduces the occurrence of selection bias of participants as well as increases the generalizability of findings to the clinical adolescent population. In addition, the inclusion of narrative identity allows for a unique and in-depth understanding of how (mal)adaptive personality development ‘colors’ one’s subjective experience and meaning making.

The planned dissemination is twofold: First, for the scientific field, the output of this research project will enhance our understanding of maladaptive personality development as a complex phenomenon in which both structural personal characteristics as well as unique individual experiences play an important role. These results will be presented at congresses and published in international peer-reviewed journals along with proposed directions for future studies. Second, for the clinical field, the results will be made available to clinicians in
newsletters and national journals, used to inform workshops and trainings and – for both clinicians, other professionals and youth – integrated in infographics, factsheets and social media posts to provide information about maladaptive personality development and inform early detection and timely interventions.

**List of abbreviations**

- **APOLO**: Adolescenten en hun persoonlijkheidsontwikkeling: een longitudinaal onderzoek. Dutch acronym meaning: Adolescents and their personality development: a longitudinal study
- **PID-5**: Personality Inventory for DSM-5
- **PID-5-SF**: Personality Inventory for DSM-5 – Short Form
- **PID-5-BF**: Personality Inventory for DSM-5 – Brief Form
- **PID-5-IBF**: Personality Inventory for DSM-5 – Informant Brief Form
- **RQ**: Relationship Questionnaire
- **IIP-32**: Inventory of Interpersonal Problems-32
- **NRI-BSV**: Network of Relationships Inventory – Behavioral Systems Version
- **TPQ**: Turning Point Questionnaire
- **TPI**: Turning Point Interview
- **CHAOS**: Confusion, Hubbub, and Order Scale
- **LEQ**: Life Events Questionnaire
- **LES**: Life Experiences Survey
- **CTQ**: Childhood Trauma Questionnaire
- **SQ-48**: Symptom Questionnaire-48
SDQ: Strengths and Difficulties Questionnaire

DTL: Developmental Task List

LPFS-BF: Level of Personality Functioning Scale – Brief Form

SWLS: Satisfaction With Life Scale

Declarations

Author Contributions

NK wrote the Background section of the manuscript. IL wrote the Methods section of the manuscript. NK and IL both contributed to the Discussion section. PH, OL and MA provided extensive feedback and advice in writing the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate
The proposal for research-project APOLO was submitted to the ethical test committee of the Faculty of Social Sciences at Utrecht University (FETC17-092) and to the ethical test committees of both participating clinical institutions (Reinier van Arkel and Vincent van Gogh). All committees approved our proposal. All participants provided written informed consent for the use of their data.

- Availability of data and materials
  
  Data sharing is not applicable to this article as no datasets were generated or analysed during the writing of this study protocol. All materials (questionnaires and infographic) can be requested from the corresponding author.

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## Appendix 1: Overview of measures used per wave and setting

| Setting | Respondent | T1 (intake) | T2 (6 months) | T3 (12 months) | T4 (18 months) | T5 (24 months) | T6 (30 months) |
|---------|------------|-------------|---------------|----------------|----------------|----------------|----------------|
| Reinier van Arkel: Centre for Adolescent Psychiatry | Participant | PID-5-SF + extra | PID-5-BF | T1 | T2 | T1 | T2 |
|         |            | RQ          | RQ            |                |                |                |                |
|         |            | IIP-32      | IIP-32        |                |                |                |                |
|         |            | NRI-BSV     | NRI-BSV       |                |                |                |                |
|         |            | TPQ(+TPI)   | TPQ(+TPI)     |                |                |                |                |
|         |            | LEQ         | LEQ2-6        |                |                |                |                |
|         |            | SQ-48       | SQ-48         |                |                |                |                |
|         |            | DTL         | DTL           |                |                |                |                |
|         |            | LPFS-BF     | LPFS-BF       |                |                |                |                |
|         |            | SWLS        | SWLS          |                |                |                |                |
|         | Parent     | PID-5-IBF   | PID-5-IBF     | T2 | T2 | T2 | T2 |
|         |            | RQ          | RQ            |                |                |                |                |
|         |            | CHAOS       | CHAOS         |                |                |                |                |
|         |            | TPQ         | TPQ           |                |                |                |                |
|         |            | DTL         | DTL           |                |                |                |                |
| Reinier van Arkel: Herlaarhof | Participant | PID-5-BF | PID-5-BF | T2 | T2 | T2 | T2 |
|         |            | RQ          | RQ            |                |                |                |                |
|         |            | NRI-BSV     | NRI-BSV       |                |                |                |                |
|         |            | LEQ         | LEQ2-6        |                |                |                |                |
|         |            | SDQ         | SDQ           |                |                |                |                |
|         |            | DTL         | DTL           |                |                |                |                |
|         |            | LPFS-BF     | LPFS-BF       |                |                |                |                |
|         |            | SWLS (item 3) | SWLS (item 3) |                |                |                |                |
|         | Parent     | PID-5-IBF   | PID-5-IBF     | T1 | T1 | T1 | T1 |
|         |            | RQ          | RQ            |                |                |                |                |
|         |            | CHAOS       | CHAOS         |                |                |                |                |
|         |            | SDQ         | SDQ           |                |                |                |                |
|         |            | DTL         | DTL           |                |                |                |                |
| Vincent van Gogh: Heldr | Participant | PID-5-SF | PID-5-SF | T2 | T2 | T2 | T2 |
|         |            | RQ          | RQ            |                |                |                |                |
|         |            | IIP-32      | IIP-32        |                |                |                |                |
|         |            | NRI-BSV     | NRI-BSV       |                |                |                |                |
|         |            | TPQ(+TPI)   | TPQ           |                |                |                |                |
|         |            | LEQ         | LEQ           |                |                |                |                |
|         |            | DTL         | DTL           |                |                |                |                |
|         |            | LPFS-BF     | LPFS-BF       |                |                |                |                |
|         |            | SWLS        | SWLS          |                |                |                |                |
|         |            | SDQ         | SDQ           |                |                |                |                |
|         | Parent     | PID-5-IBF   | PID-5-IBF     | T2 | T2 | T2 | T2 |
|         |            | RQ          | RQ            |                |                |                |                |
|         |            | TPQ         | TPQ           |                |                |                |                |
|         |            | DTL         | DTL           |                |                |                |                |
Figure 1.

Title: Participant measures used in APOLO embedded in the theoretical model by McAdams\textsuperscript{15}.

Figure Legend: This figure shows the self-report measures for adolescent participants that were used in the APOLO study. These measures fit the three-layered theoretical model by McAdams with the layers of dispositional traits (bottom), characteristic adaptations (middle), narrative identity (top), stressful life events that influence personality development (left side) and functioning that can be seen as the momentary ‘outcome’ of this development (right side).
Understanding Personality Pathology in a Clinical sample of Youth: Study Protocol for the longitudinal research project ‘APOLIO’

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Understanding Personality Pathology in a Clinical sample of Youth

Study Protocol for the longitudinal research project ‘APOLO’

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Abstract

INTRODUCTION: We propose that a dimensional, multi-layered perspective is well-suited to study maladaptive personality development in adolescents. Such a perspective can help understand pathways to personality pathology and contribute to early detection. The research project ‘APOLO’ (a Dutch language acronym for Adolescents and their Personality Development: a Longitudinal Study) is designed based on McAdams’ integrative three-layered model of (mal)adaptive personality development and assesses the interaction between dispositional traits, characteristic adaptations, the narrative identity and functioning.

METHODS AND ANALYSIS: APOLO is a longitudinal research project that takes place in two outpatient mental health care centres. Participants are adolescents between 12-23 years and their parents. Data collection is set up to build a data set for research, as well as to use the data for diagnostic assessment and systematic treatment evaluation of individual patients. Measurements are conducted half-yearly for three years and consist of self- and informant-report questionnaires and a semi-structured interview. The included constructs fit the dimensional model of personality development: maladaptive personality traits (dispositional traits), social relations, stressful life events (characteristic adaptations), a turning point (narrative identity) and functioning (e.g., achievement of youth specific milestones). Primary research questions will be analysed using structural equation modelling.

ETHICS AND DISSEMINATION: The results will contribute to our understanding of (the development of) personality pathology as a complex phenomenon in which both structural personal characteristics as well as unique individual experiences play a role. Furthermore, results will give directions for early detection and timely interventions. This study has been approved by the Ethical Review Committee of the Utrecht University Faculty for Social and Behavioural Sciences (FETC17-092). Data distribution will be anonymous and results will be disseminated via communication canals appropriate for diverse audiences, this includes both clinical and scientific conferences, papers published in national and international peer-reviewed journals and (social) media platforms.

Keywords: Personality pathology, maladaptive personality development, adolescents, clinical, study protocol, longitudinal
Strengths and Limitations of this study

This project has a large clinical sample of adolescents and their parents

APOLO has a longitudinal multi-informant, multi-concept and multi-method design

Psychometrically sound and age-appropriate measures are used

The design allows for between- and within-subjects comparisons but has no non-clinical control group

Attrition is a major challenge that is handled via clinical embedment

Introduction

Recent developments in the field of personality psychology (i.e., scientific research on personality structure) and clinical personality psychology (i.e., assessment and treatment of personality disorders) mark a gradual shift towards a dimensional and personalized understanding of personality pathology. Among others this has resulted in a proposal for the Alternative Model of Personality Disorders (AMPD) in the DSM-5\(^1\), an increased focus on developmental trajectories and precursors of personality pathology and the recognition of an individual’s wishes, motivations, social roles and the life story as central to understand and treat personality pathology, as opposed to solely deviating patterns in cognition, affect, interpersonal functioning and impulse control\(^1\). This is a promising perspective in the search for a valid way to understand maladaptive personality development and recognize personality pathology early in its development\(^4\). Based on these recent developments we designed and set up ‘APOLO’ (Dutch language acronym for Adolescents and their Personality Development: A Longitudinal Study), a longitudinal two-site research project, along a three-layered integrative model of (maladaptive) personality development. In this study protocol we use the term personality pathology when referring to pervasive, persistent and pathological personality functioning, whereas the term personality disorder refers to a categorical DSM-5-II classification\(^1\).
Personality Pathology as a developmental, dimensional and multi-faceted construct

Personality as a construct can be described both with respect to how it varies between individuals, as well as how it is unique for one person. A strong body of research has studied personality development with pivotal contributions that point to general and specific person- and environmental factors and their continuous interaction that play a role in the development of personality pathology. Personality pathology therefore do not appear overnight, but can be thought of as the result of a maladaptive personality development, best described as a process of person-environment transactions in which precursors may be defined. Specifically, person-characteristics that make one vulnerable, such as maladaptive personality trait levels (e.g. negative affectivity, antagonism), regulation problems (e.g. emotion regulation) and/or pathology (e.g. internalizing and/or externalizing symptoms), may interact with experiencing environmental characteristics that make one vulnerable, such as negative parent-child relations (e.g., insecure attachment, harsh parenting), negative peer relations (e.g., bullying) and/or experiencing childhood trauma (e.g., neglect, sexual abuse). In early-adolescence these transactions may lead to the onset of more severe problems in self and interpersonal functioning, which generally intensify in mid-adolescence and decline in late-adolescence. These functioning problems may fluctuate strongly over time and within individuals, however individual stylistic features of these problems, the ‘color’ so to speak, is much more stable. As such, maladaptive personality development is a for every person unique complex and multi-dimensional process that may lead to one outcome within the individual: pervasive, persistent and pathological problems, or personality pathology.

With regard to personality pathology, this means that classification of personality disorders as distinct categories can essentially be thought of as an oversimplified reflection of reality. Personality pathology can be described by a complex combination of adaptive and
maladaptive personality traits and strengths or difficulties in one’s functioning\textsuperscript{1,18,19}.

Accordingly, the AMPD conceptualizes personality pathology as one’s unique combination of maladaptive traits and facets (criterion B) and one’s functioning in the self and interpersonal domain (criterion A\textsuperscript{1}). This gradual shift towards a dimensional perspective ensures an increasingly better understanding of personality pathology as a nuanced phenomenon of which its development can be understood through continuous person-environment transactions\textsuperscript{20}.

**Personality pathology as a combination of multiple layers**

An integrative theoretical framework that is well-suited to study (mal)adaptive personality development is proposed by Dan McAdams\textsuperscript{21,22}. This framework has development at its core and conceptualizes personality as a dimensional construct by differentiating three interacting layers. The first layer, *dispositional traits*, represents broad dimensions of individual differences, accounting for inter-individual consistency and continuity in behaviour, thought and feeling across situations over time. This layer is conceived of personality traits like the Five Factor Model that are thought of as heritable and relatively stable\textsuperscript{23,24}. The second layer, *characteristic adaptations*, represents those aspects of human individuality that concern motivational, social-cognitive and developmental adaptations, contextualized in time, place and/or social role. In other words, the way an individual adapts in a unique way in response to the environment he or she lives in. These adaptations are thought of as less stable\textsuperscript{22,24,25}. The third layer, *narrative identity*, constitutes a personal story about one’s life that helps shape behaviour and establish identity. Through autobiographical reasoning a person creates a narrative of how different parts of, and change in, one’s past, present and future are related\textsuperscript{26}.

**APOLO’s objectives and relevance**
Recently, this model has been used to study personality pathology\textsuperscript{27,28,29,30}. However, studies are limited, especially in clinical groups, in both number and/or quality and mainly concern adult participants. The complete model has not been tested in longitudinal studies with (clinical samples of) youth, while this could greatly increase our understanding of maladaptive personality development and how it relates to current functioning. In addition, longitudinal studies particularly could contribute to early detection of personality pathology, which is essential for improving the prognosis for these vulnerable youth\textsuperscript{31,32,33}. This research project builds on existing research providing first evidence for precursors of personality pathology and extends it by studying maladaptive personality development with this integrative model. This provides the possibility to fill important gaps in the literature by integrating and broadening our understanding of maladaptive personality development and personality pathology. Specifically, by adding narratives and by conceptualizing functioning as both criterion A and achievement of developmental milestones. We herewith hope to contribute to a valid, personal and nuanced perspective on (the development of) personality pathology in adolescents. This is a perspective that has great clinical utility for both diagnostic assessment as well as treatment. With the APOLO project we aim to enhance our knowledge on personality pathology and its development by examining the interplay between the three layers of personality over time. We do this by taking a multi-method, multi-informant, multi-concept and longitudinal approach in a sample that ranges from early-adolescents to early-adults, to capture the most vulnerable period for the onset of personality pathology\textsuperscript{34}.

**Methods and analysis**

*Patient and Public Involvement Statement*

The APOLO research project is a co-creation between clinicians, experts by experience and researchers. The dimensional and developmentally sensitive design was based on the need for
a personal and nuanced approach to personality pathology, a construct that is often clouded by stigma and controversies, especially in adolescents. The design was discussed with adolescent experts by experience, who were especially positive about this dimensional and personal perspective. This could help reduce the stigma of personality pathology and lay the focus on strengths and vulnerabilities, while at the same time contributing to young people getting the help they need in time. For this reason, the APOLO project was designed with an explicit dual purpose: 1) to be used to conduct scientific research and 2) to inform the patients’ individual clinical trajectory. This study is part of the ‘Youthlab’ program in which researchers, clinicians and both clinical and non-clinical youth work together to innovate healthcare processes as well as disseminate results in order to reach the appropriate audience (i.e. symposia, infographics, vlogs, website).

Setting

APOLO is a longitudinal two-site research project of which the design started in 2017 and data-collection started mid 2018. APOLO is planned to run for at least five years. The research project is conducted in two mental health care institutes in the Netherlands: Reinier van Arkel and Vincent van Gogh. These outpatient facilities provide diagnosis and treatment to individuals with psychological, self- or social functioning problems and specialize in early detection and treatment of severe psychopathology, including personality disorders. The data collection of APOLO is an integral part of the clinical process of diagnostic assessment and systematic treatment evaluation. The project is completely funded by the collaborating institutes, Reinier van Arkel, Vincent van Gogh and Utrecht University.

Participants
The research population of APOLO consists of adolescents between ages 12 and 24, and their parents, referred for treatment to the participating institutions with varying levels of severity and/or complexity in psychological problems. APOLO is an ongoing research project. Currently (October 2021), our sample (n = 431) consists of adolescents (29% self-identified male) with ages ranging between 12 and 24 (M = 19.3; SD = 2.3). APOLO does not have strict exclusion criteria, however data collection is limited to specific treatment programs where APOLO is conducted. In these treatment programs, adolescents and young adults with primary DSM-5 diagnosis of personality disorders are included. Patients with other primary DSM-5 diagnosis such as intellectual disability, acute psychotic disorder, severe eating disorder or severe substance dependence are referred to other treatment programs.

All adolescents that are at the start of their treatment are asked to participate. In the rare case that an adolescent is included that does not fit the research population due to a wrong referral, he or she will be excluded from follow-up assessments and reallocated to another team or institute for suitable treatment.

Procedure

After adolescents are referred to one of the two specialized mental health care institutes and invited for intake in a team in which APOLO takes place, they – as well as their parents – receive an email with a link to fill out questionnaires online at home. This assessment is used for treatment indication as part of the diagnostic process at intake and therefore ‘care as usual’. The assessment at intake (or first ‘wave’) consists of a total of eleven self-report questionnaires for adolescents (duration 45-60 min.) and a total of six questionnaires for one of the parents (duration 15 min.). Adolescents and parents have access to the questionnaires three weeks prior to and after their intake appointment. Failing to fill out the questionnaires within this period results in the data for that wave being registered as missing.
Along with the invitation for their intake appointments (consisting of one appointment for intake and one for feedback and consultation, with usually three weeks in between), adolescents and their parents receive an invitation to participate in APOLO. The invitation letter contains an information folder, directions to the website and an informed consent form. Adolescents and parents are asked to give their written informed consent for using their data for scientific research. They are also informed that they can revoke their participation at any time without any consequences and will continue to receive treatment as usual. They are asked to bring the signed consent form to the intake. All therapists conducting intakes are informed of the background and practicalities of APOLO and are trained in conducting the semi-structured interview that is part of the assessment. During the intake, participants are again informed of the research project and given the opportunity to ask questions, informed consent is (signed and) handed in and a Turning Point Interview (approximately 5 minutes) is conducted and recorded on a tablet. Participants who have not yet filled out the questionnaires are given the opportunity to do so in a computer room at the institute.

Follow-up assessments are conducted every six months (counted from the date of intake) over a course of three years, resulting in a maximum of six waves. Participants receive the same measures (or a shortened test battery, see Appendix 1), the questionnaires online and the semi-structured interview via a face-to-face or telephone appointment. Participants have access to these questionnaires two weeks prior to and after the intended assessment date. Since dropout is a known issue in longitudinal research and even more so in a clinical setting, the research team makes a great effort in monitoring follow-up assessments and notifying participants (first by e-mail, then if needed by phone) when their next assessment is approaching. Furthermore, to ensure participation and prevent drop out, the assessments are consistently used in the clinical process: for treatment indication at intake, as a supplement to diagnostic assessments and for systematic treatment evaluation. Additionally, after each wave
– whether or not they are still in treatment – participants are invited for a (free) appointment with a therapist involved with the research project in which extensive individual feedback is provided about the outcomes.

Measures

The measured variables are based on the theoretical model of personality development by McAdams, see Figure 1. Assessment differs slightly between settings, see Appendix 1. Cronbach’s alphas were calculated for each measure with data from our current sample, except where not applicable (RQ, TPQ/TPI, LEQ) or insufficient data (CHAOS and SDQ). In the latter case, Cronbach’s alphas from studies with a similar sample are reported. Sample sizes that could be used to calculate Cronbach’s alpha differed for each measure due to missings, differences in the test battery between waves and attrition.

FIGURE 1 here

Figure 1. Measures used in the current study embedded into the theoretical model by McAdams.

Dispositional traits: PID-5

The PID-5-SF is a shortened version of the original 220-item Personality Inventory for DSM-5 (PID-5). The PID-5 is a self-report questionnaire that measures 5 higher order maladaptive trait domains: Negative Affectivity, Detachment, Antagonism, Disinhibition and...
Psychoticism, along 25 trait facets. The PID-5 has been translated into Dutch according to international standards under supervision by the Dutch association for psychiatry, with backwards translation by the original authors to maintain equivalence. The PID-5-SF (of which all the items are contained in the original form) measures the same 5 trait domains and 25 facets with 100 items on a 5-point Likert scale ranging from ‘completely not true’ to ‘completely true’. This version was validated for use with adults and adolescents. An overview of its psychometric properties with adolescents can be found in Koster and colleagues. Every trait domain consists of 12 items and in our sample (n = 416) Cronbach’s alphas ranged from .82 to .90. The 25-item PID-5-BF, also used in this study (see Appendix 1), is again a shortened version of the original questionnaire that measures the 5 trait domains with 25 items. The PID-5-BF has been shown to reliably and validly assess the DSM-5 traits in European adolescents and adults. Every trait domain consists of 5 items and in our sample (n = 101) Cronbach’s alphas ranged from .68 to .81. Due to differences between the PID-5-SF and PID-5-BF, participants in some cases (see Appendix 1) receive the PID-5-SF and an additional 9 items of the PID-5-BF (items 1, 4, 5, 6, 7, 8, 16, 18 & 23) in order to cover all items. Parents receive the informant version, the PID-5-IBF. Every trait domain consists of 5 items and in our sample (n = 187) Cronbach’s alphas ranged from .65 to .82.

**Characteristic adaptations: RQ**

The Relationship Questionnaire (RQ) is a 5-item self-report measure that consists of four paragraphs describing secure, preoccupied, fearful and dismissing attachment styles. Respondents are asked to first indicate which attachment style best describes them and second to rate the degree to which the four descriptions characterize them using a 7-point Likert scale, ranging from ‘not at all like me’, to ‘very much like me’. The RQ has been shown to have reasonable validity and stability in use with young adults and undergraduates.
Results correlate moderately with attachment styles determined by interview. The RQ provides a rapid assessment of attachment quality and has been used with adolescents. The RQ was translated into Dutch by Lowyck, Luyten, Hutsebaut and Corveleyn.

**Characteristic adaptations: IIP-32**

The Inventory of Interpersonal Problems-32 (IIP-32) is a 32-item self-report questionnaire measuring interpersonal difficulties. All items are rated on a 5-point Likert scale ranging from ‘not at all’ to ‘extremely’. The measure yields a score on two underlying dimensions: Affiliation and Dominance, as well as scores on eight subscales: domineering/controlling, vindictive/self-centred, cold/distant, socially inhibited, non-assertive, overly accommodating, self-sacrificing and intrusive/needy. As found in previous research, the IIP-32 has satisfactory reliability and validity and has been reliably administered to adolescent populations. In this research project, we use the Dutch language version. The subscales each consist of 4 items and in our sample (n = 426) Cronbach’s alphas ranged from .63 to .81; Cronbach’s alpha for the total scale was .87.

**Characteristic adaptations: NRI-BSV**

The Network of Relationships Inventory – Behavioral Systems Version (NRI-BSV) is a 24-item self-report questionnaire that measures how frequently different relationships are used to fulfil the functions of three behavioural systems: attachment, caregiving and affiliation. Items are answered on a 5-point Likert scale ranging from ‘(almost) never’ to ‘(almost) always’. In previous research, the NRI-BSV has been found to have adequate psychometric properties and excellent reliability. We use an 11-item version of the NRI-BSV with which the two broad domains Support and Negative Interactions can be constructed, in which participants rate their relationship with one parent of choice and a relationship with one other important
The NRI-BSV was translated into Dutch by Van Aken and Hessels\textsuperscript{57}. The support subscale consists of 5 items ($n = 432$, $\alpha = .79$ for both parent relationship and other relationship) and the negative interactions subscale consists of 6 items ($n = 432$, $\alpha = .93$ for parent relationship and $\alpha = .88$ for other relationship). Parents receive the informant version, in which they rate the relationship with their child. The support subscale consists of 5 items ($n = 176$, $\alpha = .61$) and the negative interactions subscale consists of 6 items ($n = 176$, $\alpha = .91$).

**Narrative identity: TPQ and TPI**

The Turning Point Questionnaire (TPQ) is a qualitative measure designed as an infographic (see Appendix 2 for the infographic). The TPQ is constructed as part of the theoretical framework of McAdams’\textsuperscript{58} life story model of identity, which posits that one's identity is demonstrated through the construction of a life story. Facets of one’s identity may be identified by analysing how individuals narrate significant life experiences like turning points\textsuperscript{59,60}. Turning points are specific events that are perceived to alter the normal flow and direction of one’s life\textsuperscript{61}. The TPQ asks participants if they ever experienced a life event that they might call a turning point or – if not – to pick an event that resembles a turning point. They are asked to shortly describe this event, whether they derived a lesson from this event (on a 7-point Likert scale ranging from ‘not at all’ to ‘very much’) and whether they have discussed this event with a parent/caretaker. Parents receive an informant version of the TPQ at the first wave along with the same infographic describing what a turning point is. In this informant version they are asked if they think their child has experienced a turning point and to shortly describe this event.

Subsequently, the TPQ is expanded with a short semi-structured interview that is conducted by trained clinicians and recorded, the Turning Point Interview (TPI). Participants are asked to narrate about this turning point and with three follow-up questions are asked
specific details about how this event has influenced the participant. The narratives are
transcribed and coded for theme, valence, meaning making, agency, communion and
coherence\textsuperscript{60,62,63,64}.

**Stressful life events: CHAOS**

The Confusion, Hubbub, and Order Scale (CHAOS\textsuperscript{65}) is a questionnaire that measures the
quality of the adolescents’ home environment. The questionnaire is built on the premise that
youth are better able to function in home environments with more order and less confusion
and hubbub. In previous research, the CHAOS has been found to have satisfactory internal
consistency (\(\alpha = .79\)), test-retest stability as well as validity\textsuperscript{65}. The Dutch adaptation of the
CHAOS\textsuperscript{66} used in the current research project consists of 17 items that are rated on a 5-point
Likert scale ranging from ‘not at all true’ to ‘completely true’. Only participants’ parents
receive this measure.

**Stressful life events: LEQ**

The Life Events Questionnaire (LEQ) is a self-report measure constructed out of three
existing questionnaires which were combined to fit the purpose of this research project. The
Life Experiences Survey (LES\textsuperscript{67}) was used for its structure, in which both the occurrence and
the impact of specific life events is assessed. Within this structure questions of the Childhood
Trauma Questionnaire (CTQ\textsuperscript{68,69}) and the Levensgebeurtenissen Vragenlijst (a Dutch life
events survey)\textsuperscript{70} were combined. The LEQ we used in this research project consists of 12
items that cover stressful life events in the family, personal experiences and bullying, and one
open item that asks the participant for any stressful event not covered by the items before. The
12 questions consist of two parts: first the adolescent is asked to indicate whether (yes or no)
he/she has experienced the event during his/her lifetime and secondly to indicate how much
(on a 4-point Likert scale ranging from +1 ‘positively’ to -3 ‘very negatively’) this event impacted his/her life. In all follow-up waves participants are asked whether they have experienced the events since the last wave.

**Functioning, symptoms: SQ-48 and SDQ**

Within the domain of functioning, two questionnaires are used to assess symptoms (see Appendix 1 for details). The 48-item Symptom Questionnaire (SQ-48) is a self-report questionnaire measuring psychological distress with 9 subdomains: depression (6 items), anxiety (6 items), somatization (7 items), agoraphobia (4 items), aggression (4 items), cognitive problems (5 items), social phobia (5 items), work functioning (5 items), and vitality (6 items). All items are rated on a 5-point Likert scale ranging from ‘never’ to ‘very often’.

The SQ-48 has good internal consistency as well as good convergent and divergent validity. An additional study showed that the SQ-48 has excellent test–retest reliability and good responsiveness to therapeutic change. In our sample (n = 389), Cronbach’s alphas ranged from .74 to .92 for the subscales and was .94 for the total scale.

The Strengths and Difficulties Questionnaire (SDQ) is a 25-item questionnaire that measures psychopathological symptoms in children and adolescents with 5 subdomains, containing 5 items each: emotional symptoms, conduct problems, hyperactivity-inattention, peer relationship problems, and prosocial behaviours. All items are rated on a 3-point Likert scale ranging from ‘not true’ to ‘certainly true’. In APOLO, the Dutch translation of the SDQ is used, which has been found to have good concurrent validity. For the self-report version, Cronbach’s alphas in a study using a similar sample ranged from .45 to .72 for the subscales and was .78 for the total scale. For the parent version, Cronbach’s alphas ranged from .55 to .78 for the subscales and was .80 for the total scale.
Achievement of youth-specific milestones was assessed using a newly developed measure: The Developmental Milestones List (DML). The DML is a 28-item questionnaire including tasks and activities reflective of youth-specific developmental milestones. The first 21 items of this list ask, on a 7-point Likert scale, to what extent the participant experiences trouble in the achievement of youth-specific milestones. These items combine to a total scale. The specific milestones may be divided into three broader domains based on previous work on youth-specific milestones: social (e.g., relationships with peers), personal (e.g., autonomy) and professional (e.g., school/work). The last 7 items of this list were included specifically for (our) clinical populations, providing an indication, on a 4-point Likert scale, of clinical severity that may hamper the achievement of milestones (e.g., problems in accepting help, auto mutilation, drug abuse). In our sample (n = 426), Cronbach’s alpha for the total scale was .78. Parents receive an informant version of the DML. In our sample (n = 179), Cronbach’s alpha for all items was .88.

The Level of Personality Functioning Scale – Brief Form (LPFS-BF) was developed as an easy-to-use tool to self-assess whether particular problems were likely related to personality dysfunction. It is a measure of self- and interpersonal functioning, as an operationalization of global personality functioning. The LPFS-BF consists of 12 questions which are clustered into four subscales (Identity, Self-Direction, Empathy, and Intimacy). These subscales are clustered into two higher domains, Self-functioning and Interpersonal Functioning. Participants respond to these questions on a 4-point Likert scale ranging from ‘not at all true or often untrue’ to ‘often true or completely true’. In our sample (n = 421), Cronbach’s alpha
was .74 for the Self-functioning subscale, .71 for the Interpersonal Functioning subscale and .79 for the total scale.

Functioning: SWLS

The Satisfaction With Life Scale (SWLS) contains five items to measure global judgments of satisfaction with one’s life. We use the Dutch translation of the SWLS. Items are scored on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). The five items are summed. In our sample (n = 424), Cronbach’s alpha for the total scale was .80.

Research Questions, Power Calculation and Data handling

This project has the overarching aim to examine the interplay between the three layers of personality development as proposed by McAdams and colleagues in an clinical sample of youth and how this interplay is related to (personality) functioning. Specifically, the two primary research questions are as follows: 1) Is there evidence for unique or distinctive (group)-patterns in which characteristics from McAdams’ layered model of personality development are related in a clinical sample of youth and 2) How are distinctive patterns related to trajectories of change in functioning? Characteristics of McAdams model are operationalized as maladaptive personality traits (dispositional traits; layer 1), attachment, interpersonal style, social network, experienced life events (characteristic adaptations; layer 2) and turning point narratives (narrative identity; layer 3). Functioning is operationalized as the achievement of developmental milestones, self- and interpersonal functioning, satisfaction with life and psychopathological symptoms. Characteristics in the first two layers of McAdams’ model have often been identified as precursors of personality pathology in previous studies. Distinctive group-patterns in how these characteristics function as symphonic structure will be explored cross-sectionally using Latent Class Modeling in Latent
Gold'. Testing across-level and longitudinal associations in the three layers and functioning will be done using Structural Equation Modelling (SEM) in MPlus. Due to the large number of constructs in the complete model, specific associations between different layers will be tested separately, to ensure adequate power and avoid the problem of multiple testing. For example one study will focus on how the predictive association between maladaptive personality traits (layer 1) and agency and communion in narratives (layer 3) is moderated or mediated by interpersonal style (layer 2). Power was considered for these primary research questions and based on both simulations and rules of thumb of the power needed to analyse complex SEM models with multiple variables and missing data a sample size of >300 complete cases should be adequate. To analyse latent classes, considering the assumed class separation, effect size and complexity of the data, a sample size of >500 is suggested. In the case of data difficulties like measurement non-invariance or differential item functioning, which may be likely in a clinical data set with multiple variables, this technique is also suitable. For our primary research questions we hypothesize that there will be distinctive group-patterns that may point to individuals with more or less pronounced vulnerability profiles. We expect that a more vulnerable profile will be associated with a less adaptive developmental course in terms of personality functioning. However meaning making (reflected by narrative identity, layer 3), may play a moderating or mediating role.

Secondary research questions will address concurrent and longitudinal associations in McAdams’ model piece by piece, namely between precursors, the social network, the narrative identity and specifically criterion A and B of the AMPD. For example, one study will focus on the association between self-event connections (layer 3) and personality functioning over time, controlling for negative affectivity (layer 1) in a regression model. Another study will focus on transactions between maladaptive personality traits (layer 1) and the social network (layer 2) using a random intercept cross lagged panel model.
cooperation was set up with the data laboratory of Utrecht University to store the data that were collected at all locations. This ensures reliable and secure data management while data-collection is ongoing.

Ethics and dissemination

APOLO combines a longitudinal scientific study and clinical implementation of a multi-layered dimensional model of maladaptive personality development in an outpatient clinical adolescent sample. APOLO measures several constructs according to three-layered model of personality development, taking a multi-method, multi-concept and multi-informant approach. The data collection and handling is set up in such a way that it 1) provides the opportunity to study important scientific questions concerning maladaptive personality development and 2) informs the individual clinical process, providing patients with a direct benefit of completing the measures. As such, this project is inevitably faced with challenges, of which attrition and the balance between ensuring an anonymous and scientifically sound longitudinal dataset while also making appropriate use of the data for individual clinical trajectories are the most prominent. Cooperation between the different clinical sites is a challenge that is approached flexibly to ensure clinical embedment and prevent attrition, resulting in slight differences between the number and type of instruments included. The embedding of this project in the clinical structure is therefore an essential but also unique feature on which a lot of effort and time is spent. Furthermore, recruitment of all adolescents referred to the involved institutes reduces the occurrence of selection bias of participants as well as increases the generalizability of findings to the clinical adolescent population. In addition, the inclusion of narrative identity allows for a unique and in-depth understanding of how (mal)adaptive personality development ‘colors’ one’s subjective experience and meaning making.
The planned dissemination is twofold: First, for the scientific field, the output of this research project will enhance our understanding of maladaptive personality development as a complex phenomenon in which both structural personal characteristics as well as unique individual experiences play an important role. These results will be presented at congresses and published in international peer-reviewed journals along with proposed directions for future studies. Second, for the clinical field, the results will be made available to clinicians in newsletters and national journals, used to inform workshops and trainings and – for both clinicians, other professionals and youth – integrated in infographics, factsheets and social media posts to provide information about maladaptive personality development and inform early detection and timely interventions.

List of abbreviations

APolo: Adolescents en hun persoonlijkheidsontwikkeling: een longitudinaal onderzoek.

PID-5: Personality Inventory for DSM-5

PID-5-SF: Personality Inventory for DSM-5 – Short Form

PID-5-BF: Personality Inventory for DSM-5 – Brief Form

PID-5-IBF: Personality Inventory for DSM-5 – Informant Brief Form

RQ: Relationship Questionnaire

IIP-32: Inventory of Interpersonal Problems-32

NRI-BSV: Network of Relationships Inventory – Behavioral Systems Version

TPQ: Turning Point Questionnaire

TPI: Turning Point Interview
516 CHAOS: Confusion, Hubbub, and Order Scale
517 LEQ: Life Events Questionnaire
518 LES: Life Experiences Survey
519 CTQ: Childhood Trauma Questionnaire
520 SQ-48: Symptom Questionnaire-48
521 SDQ: Strengths and Difficulties Questionnaire
522 DML: Developmental Milestones List
523 LPFS-BF: Level of Personality Functioning Scale – Brief Form
524 SWLS: Satisfaction With Life Scale

526 Declarations

527 • Author Contributions

528 NK wrote the Background section of the manuscript. IL wrote the Methods section of the
529 manuscript. NK and IL both contributed to the Discussion section. PH, OL and MA provided
530 extensive feedback and advice in writing the manuscript. All authors read and approved the
531 final manuscript.

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535 agency in the public, commercial or non-profit sectors.
• Competing interests

The authors declare that they have no competing interests.

• Ethics approval and consent to participate

The proposal for research-project APOLO was submitted to the ethical test committee of the Faculty of Social Sciences at Utrecht University (FETC17-092) and to the ethical test committees of both participating clinical institutions (Reinier van Arkel and Vincent van Gogh). All committees approved our proposal. All participants provided written informed consent for the use of their data.

• Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analysed during the writing of this study protocol. All materials (questionnaires and infographic) can be requested from the corresponding author.

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Figure 1. Measures used in the current study embedded into the theoretical model by McAdams.

LEQ: Life Events Questionnaire
CHAOS: Confusion, Hubbub, and Order Scale
TPQ: Turning Point Questionnaire
TPI: Turning Point Interview
RQ: Relationship Questionnaire
NRI-BSV: Network of Relationships Inventory – Behavioral Systems Version
IIP-32: Inventory of Interpersonal Problems-32
PID-5: Personality Inventory for DSM-5
SQ-48: Symptom Questionnaire-48
SDQ: Strengths and Difficulties Questionnaire
DML: Developmental Milestones List
LPFS-BF: Level of Personality Functioning Scale – Brief Form
SWLS: Satisfaction With Life Scale

643x355mm (72 x 72 DPI)
## Appendix 1: Overview of measures used per wave and setting

| Setting                              | Respondent | Measures                                                                                           | T2 (6 months) | T3 (12 months) | T4 (18 months) | T5 (24 months) | T6 (30 months) |
|--------------------------------------|------------|----------------------------------------------------------------------------------------------------|---------------|----------------|----------------|----------------|----------------|
| Reinier van Arkel: Centre for Adolescent Psychiatry | Participant | PID-5-SF + extra RQ IIP-32 NRI-BSV TPQ(+TPI) LEQ SQ-48 DML LPFS-BF SWLS                           |               | T2 (intake)   |               | T1             | T2 (intake) |
|                                       | Parent     | PID-5-IBF RQ CHAOS TPQ DML                                                                      |               | T2 (intake)   |               | T2 (intake)   | T2 (intake)   |
| Reinier van Arkel: Herlaarhof         | Participant | PID-5-BF RQ NRI-BSV LEQ SDQ DML LPFS-BF SWLS (item 3)                                        |               | T2             |               | T2             | T2             |
|                                       | Parent     | PID-5-IBF RQ CHAOS SDQ DML                                                                      |               | T2             |               | T2             | T2             |
| Vincent van Gogh: Heldr              | Participant | PID-5-SF RQ IIP-32 NRI-BSV TPQ(+TPI) LEQ DML LPFS-BF SWLS                                       |               | T2             |               | T2             | T2             |
|                                       | Parent     | PID-5-IBF RQ TPQ DML                                                                            |               | T2             |               | T2             | T2             |

**Note:** PID-5, SF, RQ, IIP, NRI-BSV, TPQ, LEQ, SQ-48, DML, LPFS, SWLS, SDQ, LEQ2-6, BSV, TPQ, +TPI, DML, TPQ(+TPI), LEQ2-6, SF.
Appendix 2

Infographic that was used to explain the concept of a turning point to participants

Note. The original infographic was in Dutch. The English translation was created for the purpose of this manuscript and was not used in the APOLO study.