

Procedure

A paper-and-pencil questionnaire is used for the collection of the data. In addition to socio-demographic data (age, gender, and school type), it will capture the smoking status of the school students concerning cigarettes and multiple other tobacco products (such as e-cigarettes and water pipes). These items are based on three established studies [1-3] and were either used in the original form or adapted to the specific circumstances of the present study.

Because no German equivalents of the instruments were yet available, we used the Conceptual Method for translation described by the WHO/UNESCAP Project on Health and Disability Statistics [4]. With reference to the cited protocol, we researched the concepts underlying each item; if those were not published, we contacted the authors. As native German speakers, we then translated the items from English to German in accordance with those concepts. As a last step, an external bilingual expert who is familiar with tobacco prevention research was asked to comment on each of the items whether the translation had been done correctly or whether there was need for improvement. Finally, comments from the translation checker were reviewed and a final version was mutually agreed on.

Newly translated and/or modified materials were pretested extensively and subjected to statistical analyses (internal consistency/Cronbach's α , exploratory (EFA) and confirmatory factor analyses (CFA), which represented the basis for item selection. In the following, the different subscales will be described. Scale descriptives are reported in Table 1. To test the questionnaire and our survey protocol in accordance with the Good Epidemiologic Practice (GEP) guidelines [5], we distributed 200 copies to pupils with the lowest education level in May, June and July 2015 in Gießen and Jena (Germany). The first version of the questionnaire took 30 minutes. It turned out

that some items were too hard to understand for pupils at the low educational levels. In accordance, we integrated explanatory texts, changed the formatting and retested / optimized the new versions of the questionnaire with success.

Finally, a pilot study was performed, with a total of 30 participants from Gießen (grades six and seven of a school with the lowest education level) and a total of 61 participants from Jena with the highest educational level. Students were 11 to 15 years old ($M = 12.70$, $SD = .88$). Of the 91 students for whom valid data were available, 54 were boys and 36 were girls; one student failed to indicate his/her sex.

Table 1: Scale descriptives (final versions)

	<i>M</i>	<i>SD</i>	α	#items	Range	
					theor.	emp.
Attitude Towards Smoking (higher scores = more negative attitude)	31.68	5.08	.89	7	7–35 ¹	12–35
Perceived Behavioral Control (higher scores = harder to exert control)	9.25	3.65	.85	6	6–24	6–24
Subjective Norm (higher scores = greater acceptance of smoking)	12.11	3.80	.83	8	8–32	8–25
De-facto norm	– ²	– ²	.78	8	– ²	– ²

¹ The answering scale ranged from 1–5 in the piloting phase but will be reduced to 1–4 in the final version for reasons of consistency with the original.

² cannot be computed due to differently scaled items (yes/no vs. 5-point rating scale)

Smoking Behavior. Smoking behavior was assessed through multiple measures.

The primary endpoint (smoking status) is measured by the original items of the

National Youth Health Survey (NYTS) 2014 by the Center for Disease Control [3].

The two NYTS items quantifying the number of cigarettes smoked per day in the last 30 days and the standard Fagerström item on the first cigarette item smoked during the day amount to the Heaviness of Smoking Index and will be useful for multilevel analysis [6]. Past smoking behavior was assessed with an item from Van de Ven et al. [2].

Intention to Smoke and to Quit. Behavioral intention predicts smoking behavior directly, as posited by the TPB. Students' intention to smoke was assessed using a one-item measure translated from Van De Ven et al. [2], which was supplemented by the option "I already smoke" to account for students who have already started smoking. Because the intervention presented here would be successful if fewer students started smoking and if more students quit smoking (or at least developed a stronger intention to do so), we included one item from the Hutchinson Study whether those students who were already smoking had the intention to quit, which, in line with the TPB, would predict abstinence in smokers.

Attitude Towards Smoking. As posited by the TPB, a positive attitude towards smoking predicts a person's behavioral intention which, in turn, predicts smoking behavior. We used a translation of the 7-item pro-smoking attitude scale by Van De Ven et al. [2]. Because their original bipolar items proved too difficult for the students, we used the positive extreme of all items only and reduced the answering scale from a seven- to a four-point scale, which proved easier to understand and thus to handle for students (1 = *exactly true*, 2 = *rather true*, 3 = *rather not true*, 4 = *not true at all*) Cronbach's $\alpha = .89$ indicated good reliability. Both EFA (Principal Components Analysis [PCA], Oblimin rotation; 56.88% variance explained by one factor) and CFA results ($\chi^2 = 41.09$, $df = 14$, $p < .001$, CFI = .92, RMSEA [90% CI] = .147 [.096;.201],

SRMR = .054) suggested that the assumed one-factor solution was supported by the data, too.

Perceived Behavioral Control. According to the TPB, perceived behavioral control predicts behavior both directly and indirectly via behavioral intentions. The scale was translated from Van De Ven et al. [2]. Considering the crucial role of friends' behavioral norms during adolescence [7], we thought it meaningful to differentiate the original item of being offered a cigarette by "someone" into "friends" and "strangers". Cronbach's $\alpha = .85$ (when "someone" was replaced by "friends") indicated good reliability. However, because CFA results suggested worse fit when both items were included, we decided to stick with the original six-item scale. EFA and CFA results (with "someone" replaced by "friends") suggested adequacy of the one-factor solution (EFA/PCA, Oblimin rotation: 50.17% variance explained; CFA: $\chi^2 = 22.80$, $df = 9$, $p = .007$, CFI = .93, RMSEA [90% CI] = .131 [.065;.199], SRMR = .048). The five-point answering scale was maintained; however, as students had had difficulties when only the extremes were anchored verbally, we decided to add a description to each individual option (1 = *very easy*, 2 = *rather easy*, 3 = *neutral*, 4 = *rather hard*, 5 = *very hard*).

Subjective Norm. Perceived norms are the third predictor of behavioral intentions as posited by the TPB. Van De Ven et al.'s original scale [2] comprised of three items only (best friend, friends, parents). However, as adolescence is characterized by an increase of one's action scope, we supplemented the original scale by several additional items (classmates overall; family overall; teachers; other adults, such as sports trainers or music teachers; adults in the street). By including different contexts, we hope to draw a more differentiated picture of the norms affecting behavioral intentions. EFA (PCA, Oblimin rotation) suggested that the resulting 8-item scale

consisted of two distinct factors that could be interpreted as “close” (family, friends, classmates) and “distant” (teachers, trainers, strangers) relationships; together, they accounted for 62.33% of the variance. CFA results showed that differentiating within the “close relationships” group (i.e., splitting it up into “friends” and “family”) improved model fit substantially (2-factor solution: $\chi^2 = 52.51$, $df = 27$, $p = .002$, CFI = .92, RMSEA [90% CI] = .103 [.060;.144], SRMR = .102; 3-factor solution: $\chi^2 = 34.53$, $df = 25$, $p = .10$, CFI = .97, RMSEA [90% CI] = .065 [.000;.114], SRMR = .088). Items were rated on a four-point scale, similar to the original (1 = *very bad*, 2 = *rather bad*, 3 = *rather good*, 4 = *very good*).

De-Facto Norm. To explore whether discrepancies between perceived subjective norms and actual smoking behaviors in the students’ context added to the explanation of smoking behavior, we asked students whether their mother, their father, an older brother or sister, or one of their best friends smoked. These yes-no questions were supplemented by six items describing the smoking behaviors of the groups that also appeared in the subjective norm items¹. The question how many people from these groups smoked was answered on a rating scale (anchors: 0 = *no one*, 1 = *less than half*, 2 = *about half*, 3 = *more than half*, 4 = *[almost] all*). EFA suggested a two-factor structure comparable to that of the subjective norm (PCA, Oblimin rotation, 59.80% variance explained). Here also, CFA results suggested better (though far from perfect) fit of the three-factor solution (despite the missing item, see footnote; 2-factor solution: $\chi^2 = 57.93$, $df = 19$, $p < .001$, CFI = .74, RMSEA [90% CI] = .152 [.108;.197], WRMR = .947; 3-factor solution: $\chi^2 = 37.10$, $df = 17$, $p = .003$, CFI = .87, RMSEA [90% CI] = .115 [.064;.166], WRMR = .734)

¹ One item, the one on sports trainers, music teachers, and other adults, had accidentally been omitted from the piloting questionnaire, but will be included in the final version to make subjective and de-facto norms comparable.

Demographical data. The questionnaire was rounded off by items on the students' age, migration background, fathers' and mothers' educational level, family structure (living with mother, father, or both parents), GPA from last report card, and student sex. Those items were translated from the Hutchinson Smoking Prevention Project questionnaire [1]. As some of the post-intervention questionnaires concerned looks, which may be rather in line with the feminine stereotype, and because the question whether stereotype threat affects answers is still far from resolved, these questions were asked post to the smoking-related items. The standardized and state-of-the-art delivery of the intervention (in accordance with the goldstandard introduced in the Hutchinson Smoking Prevention Project evaluation) is assured by two items from the Hutchinson questionnaire checking for a) that the survey is not announced by the teachers and b) confidentiality and anonymity of the questionnaire is made clear by the trained data collectors; both items stem from the HSPP questionnaire [1].

The German version of the questionnaires used will be published alongside the publication for details.

1. Peterson AV, Kealey KA, Mann SL, Marek PM, Sarason IG: **Hutchinson Smoking Prevention Project: Long-Term Randomized Trial in School-Based Tobacco Use Prevention—Results on Smoking.** *Journal of the National Cancer Institute* 2000, **92**(24):1979-1991.
2. Van De Ven MO, Engels RC, Otten R, Van Den Eijnden RJ: **A longitudinal test of the theory of planned behavior predicting smoking onset among asthmatic and non-asthmatic adolescents.** *Journal of behavioral medicine* 2007, **30**(5):435-445.
3. Center for Disease Control (CDC): **National Youth Tobacco Survey (NYTS).** 2015.
4. Robine J, Jagger C: **Translation & Linguistic Evaluation protocol & Supporting Material.** *WHO/UNESCAP Project on Health and Disability Statistics* 2003.
5. Deutsche Arbeitsgemeinschaft für Epidemiologie: **Leitlinien und Empfehlungen zur Sicherung von Guter Epidemiologischer Praxis (GEP).** *BMBF Gesundheitsforschung*: http://www.gesundheitsforschung-bmbf.de/media/Empfehlungen_GEPpdf 2004.
6. John U, Meyer C, Schumann A, Hapke U, Rumpf H-J, Adam C, Alte D, Lüdemann J: **A short form of the Fagerström Test for Nicotine Dependence and the Heaviness of Smoking Index in two adult population samples.** *Addictive behaviors* 2004, **29**(6):1207-1212.

7. **H F: Entwicklungspsychologie des Jugendalters.** *VS Verlag für Sozialwissenschaften, Wiesbaden 2005.*